

Essential Vegetables Box Set

R. J. Ruppenthal

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How to Grow POTATOES

Planting and Harvesting
Organic Food From Your
Field, Backyard, Balcony,
or Backyard Garden

By R.J. Ruppenthal

How to Grow Tomatoes, Peppers, & Eggplant

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Essential Vegetables Box Set

4 Books in 1 Package
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Fall and Winter Gardening

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Organic Gardening with
Tomatoes, Potatoes, Peppers,
Eggplants, Beans, Peas, Carrots,
Broccoli, Cabbage, and More

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Planting and Growing Organic
Green Beans, Sugar Snap Peas, and
Heirloom Dry Beans and Peas

Essential Vegetables Box Set (4 Books in 1 Package): Organic Gardening with Tomatoes, Potatoes, Peppers, Eggplants, Broccoli, Cabbage, and More

By R.J. Ruppenthal, Attorney/Professor/Garden Writer

1. Introduction: Four Useful Books in One Package

2. How to Grow Potatoes

3. How to Grow Tomatoes, Peppers, and Eggplant

4. How to Grow Beans and Peas

5. Fall and Winter Gardening

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Introduction to this Set

This book is a bundled package that combines four practical books. Together, they can help you grow over 30 different delicious organic vegetables in your home garden. These works are particularly helpful for beginning gardeners and anyone who has never grown these vegetables. They are appropriate for urban gardeners as well as others, since they cover both traditional gardening and container gardening for small spaces.

Each of these books is available separately, but this package gives you a discount on all four. The first book, *How to Grow Potatoes*, is one of my most popular gardening books. Everyone should grow these simple and delicious tubers in their yard, or in containers on their patio, doorstep, rooftop, balcony, or deck. I wrote *Potatoes* because there was a lack of good information out there on both traditional and innovative methods of spud growing. I saw some good books, but who really wants to pay \$20 for a huge book about potatoes?

This book covers the basics of potato growing, walks you through all the information you need on selecting different types, proper soil, materials, planting, fertilization, watering, care, harvest, and storage. It also introduces you to some creative ideas for getting plants to produce more potatoes. Just the basics, no fluff, at a very low price people can afford.

Fast forward to the next book in this set, which is *How to Grow Tomatoes, Peppers, and Eggplant*. This is one of my newer books. Tomatoes are most peoples' favorite homegrown gardening crop, and for good reason. Anyone who has tasted a homegrown tomato will tell you how much better it tastes than anything in the store. Peppers, including sweet peppers and spicy chili peppers, generally are recognized as the second most popular home food crop in the United

States, Top 10 in the United Kingdom, and popular elsewhere also.

Why eggplants? As Asian and Italian gardeners will tell you, they're really good when grown at home. As with tomatoes and peppers, the home organic gardener suddenly has access to dozens of different varieties of eggplants (hundreds, or maybe thousands in the case of tomatoes and peppers!). And it turns out they are WAY yummier than the store-bought ones.

The neat thing is that tomatoes, peppers, and eggplants are all so closely related that their growing needs and habits are very similar. So if you learn to grow tomatoes well (as you will from this book!), then you can pop a few eggplant and pepper plants, treat them the same way, and they will reward you with lots of delicious organic vegetables. Once again, this book is a concise guide to growing these three veggies, leading you through proper site selection, planting them from seed or seedling, appropriate support from stakes, cages, or trellises, proper watering, fertilization, and care, and three advanced tips for pampering your plants into producing lots and lots of really good tomatoes, peppers, and eggplants. It's all here.

Third in this set is my *How to Grow Beans and Peas* book. With the rising cost of food, more people need to learn how to grow some of their own protein. These wonderful legume plants provide you with a dirt cheap source of high quality protein and vegetables in both warm and cool season weather. Beans, peas, lentils, soybeans, mung beans, adzuki beans, cowpeas, limas, green (snap) beans, sugar snap peas, snow peas, runner beans, fava beans...they're all in here. You will learn the differences between bush and pole varieties and how you can make the most of your garden or container growing space using either one.

If you have never tasted heirloom beans, you are in for a treat. This book introduces you not only to growing these wonderful foods. It also provides you with a range of important sources for obtaining rare, heirloom bean seeds. These are the foods our ancestors grew, and many of them taste far better than the bland, pithy beans to which we have become accustomed. This small book is another thorough yet concise guide to garden and soil preparation, obtaining the best seeds, planting, trellising, watering, fertilizing, care, harvesting, drying, and storage of beans and peas. After you finish reading this book, I hope you will join me in planting some heirloom beans to carry on some of these rare varieties that taste so great and have such important histories behind them.

Finally, you get one more book in this set: *Fall and Winter Gardening*. This is a de facto growing guide to 25 cool-weather vegetables. It includes many favorite vegetables such as broccoli, carrots, cabbage,

spinach, beets, parsley, collards, kale, and lettuce. This book also covers some related plants you may have not considered, but which can grace your cool season vegetable beds, raised beds, and containers with easy-to-grow and exotic appeal: arugula, bok choy (pak choi), endive, mache, orach, cress, and more. This book will guide you through garden preparation, determining when to plant in your area for a late-season harvest, proper organic care and fertilization, extending your season, and harvesting and storing your produce so that you can eat fresh food all year long. Again, it sticks to the basics and covers what you need in a small package.

Since I started publishing my works for Kindle, and later converting some of them into small print editions on Amazon, these short growing guides have been my focus. People like paying less, getting the needed information on how to grow their own food, and calling it a day. So I don't include much fluff in my works. And this marks the first time I have published a longer work on Kindle, though it is simply a combination of earlier works. Here they are. Enjoy!

How to Grow Potatoes: Planting and Harvesting Organic Food From Your Patio, Rooftop, Balcony, or Backyard Garden (Booklet)

By R.J. Ruppenthal, Attorney/Professor/Garden Writer

- 1. Why Grow Potatoes? Six Great Reasons**
- 2. Different Kinds of Potatoes (and Where to Get Them)**
- 3. Growing in Containers, Raised Beds, and Traditional Rows**
- 4. Planting and Hilling Potatoes**
- 5. Soil, Fertilizer, and Watering Needs**
- 6. Harvesting Potatoes**
- 7. Storing Potatoes for Later Use**

Bonus: Two Secret Tips for Getting More (and More Delicious) Potatoes

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Chapter 1: Why Grow Potatoes? Five Great Reasons

Potatoes are one of the simplest food crops to grow at home. In this booklet, you will learn how to plant and grow potatoes in any sized garden. Even if you have no garden at all, and merely a doorstep, patio, rooftop, balcony, or deck, you can grow potatoes in very small spaces. Learn which type of containers potatoes thrive in, producing bigger harvests than you'll ever get from a bed in the ground. Learn how to select potatoes that mature earlier than others, giving you a quick harvest even in a short season climate with cold winters.

Be More Self-Sufficient

No other food crop allows you to do so much with so little as the potato. In fact, this is the most productive food staple you can produce at home. Just imagine how much space it would take to grow enough wheat, rye, oats, barley, or rice to feed a family. Yet you can grow enough potatoes on your doorstep to feed a person for days.

Potatoes pack more food energy per square foot than anything else you can grow. The only other food that even comes close is corn, but corn cannot touch the humble spud. Potatoes can produce more than 15,000 pounds per acre, while corn produces closer to 6,000 pounds. Here are the yields of some common food staples in terms of calories per acre. Yes, I know you and I are dealing in square feet (and maybe even square inches), but this gives you a sense of potato power:

Potatoes: 17.8 million calories per acre

Corn: 12.3 million calories per acre

Wheat: 6.4 million calories per acre

Soybeans: 2.1 million calories per acre

Beef: 1.1 million calories per acre

No wonder the Irish, with a difficult growing climate and poor soil, mono-cropped with potatoes. Prior to the potato famine of 1845-49, the average person in Ireland was eating about seven pounds of potatoes per day (and not much else). Currently, the average American eats 140 pounds of potatoes per year, or about 1/3 pound per day. For perspective, that is equal to one medium-sized Idaho russet potato every day.

It is important to eat a broad diversity of foods. I will never encourage you to eat only potatoes or to make potatoes the main part of your diet. But because we will discuss potato yields in this book, I want you to keep those consumption figures in mind. It will help keep things in

perspective.

For example, if you learn in a later chapter that you can grow 15 pounds of potatoes in a certain type of container, you will know that this yield could allow you to eat one potato a day (the American consumption average) for at least 40 days. And in case of an emergency (hurricane, earthquake, prolonged power outage, etc.), keeping a few of these containers in service and near harvest would ensure several days' worth of emergency rations for a family of four.

Let's hope you never need this security, but it never hurts to be prepared. If you doubt the importance of good emergency preparation, then please watch some video clips of natural disasters and their aftermath. The aftermath of Hurricane Katrina in 2005 was enough to scare me. We cannot rely on the government to provide for us every time.

Potatoes are Nutritious

Potatoes provide much of the nutrition your body needs on a daily basis. One medium-sized potato delivers 110 fat-free calories, 45% of your daily need for vitamin C, 18% of your needed potassium, 10% of your vitamin B6, 8% each of your vitamin B1 and B3, 6% each of your iron, folate, phosphorus, and magnesium, plus plenty of other minerals in smaller concentrations.

Much of the nutrition is located in the potato skin, so you need to leave this on when you eat. Of course this is easier to eat the skin with tender new potatoes than leathery russet potatoes. Unfortunately, there is one more reason you might not want to eat the skin: it may be full of pesticides.

Conventionally-grown (Non-organic) Potatoes are Covered with Pesticides

The United States government regularly tests for pesticide residue on food through the USDA Pesticide Data Program. Each year, an organization called the Environmental Working Group (EWG) comes up with its "Dirty Dozen" and "Clean Fifteen" lists of fruit and vegetables by analyzing this pesticide data from the United States government. Potatoes [made the "Dirty Dozen" list once again this year](#), showing higher pesticide residue levels than any other fruit or vegetable.

In the most recent year, testing revealed that 37 pesticides are used on conventional potatoes. These include known carcinogens, neurotoxins, hormone disruptors, and reproductive toxicants. The EWG analysis showed that 84% of potato samples tested contained at least one bug killer or weed killer. No wonder we use so much ketchup on our fries.

Here, I will repeat two paragraphs from my *Blueberries in Your Backyard* book, since I cannot re-state the dangers of pesticides any more effectively than these experts can.

You do not want to consume these pesticides and you certainly do not want to feed them to your kids. According to natural health and wellness expert Dr. Andrew Weil, pesticides are “associated with a host of very serious health problems in people, including neurological deficits, ADHD, endocrine system disruption and cancer. Whenever possible, avoid exposure to pesticides, including pesticide residues on food.” <http://www.ewg.org/foodnews/press>

Dr. Harvey Karp, pediatrician and author of The Happiest Baby on the Block added: “I really worry that pesticides on food are unhealthy for the tender, developing brains and bodies of young children... Studies show even small amounts of these chemicals add up and can impair a child's health when they're exposed during the early, critical stages of their development. When pesticide sprayers have to bundle up in astronaut-like suits for protection, it's clear parents want to feed their families food containing as little of these toxic chemicals as possible.” <http://www.ewg.org/foodnews/press>

In Washington state, the nation's second-largest producer of potatoes after Idaho, growers applied more than 19 million pounds of pesticides on their potato crop in a recent year. However, [a study from Washington State University determined that organic farming practices actually create larger and more productive potato plants.](#)

Some commercial potato farmers will not eat the potatoes they grow, since these are so heavily sprayed. These growers are known to keep their own “homegrown” potato patches, away from the main crop, which are clear of any sprays. Sadly, only 1% of Washington's potatoes are grown organically.

When you grow your own potatoes at home, you will not have to play Russian roulette with your health. You can eat potatoes and feed them to your kids, knowing they are grown in good soil that makes them nutritious. Just as importantly, you'll know what your potatoes don't

contain. Grow as many as you can at home, and the rest of the time, try to buy organic.

Great for Kids

Kids love picking potatoes. Finding those white, gold, purple, and red tubers in the soil is like uncovering buried treasure. If you cannot get your kids to eat their vegetables, try involving them in the garden (even if it's just one container on your doorstep). When kids see where their food comes from and share in the excitement of harvesting it, everything changes. They become far more likely to eat and enjoy their veggies (okay, not all their veggies, but more than before).

Many vegetables in our garden (cucumbers, carrots, snap peas, and tomatoes) never even make it into the kitchen. Kids eat them on the spot. This does not hold true with spuds, which are cooked before eating, but they're quite the popular item after that. One of our kids loves potatoes and the other one doesn't, but both are eager to eat them once reminded that "these are the potatoes you picked." It makes a huge difference.

Do not rely on my opinion alone. Read an article entitled, "[Children Eat More Fruits and Vegetables If They Are Homegrown](#)", in [Science Daily](#). The article reported on a study at Saint Louis University. The study provided clear evidence that kids who eat homegrown produce are twice as likely to eat their fruits and veggies every day. This is, most likely, a lifetime benefit.

Save Yourself Some Money

Some foods we buy are very expensive in the stores, yet easy to grow at home. This is true with blueberries, the subject of [another short book I wrote](#). Blueberries cost up to \$11/pound in supermarkets. Yet the bushes thrive like weeds in the home garden, producing plenty of berries once you put them in the right soil.

In contrast, taters are pretty cheap to buy. If you're like the average American, eating 140 pounds of taters per year, your spud addiction may only cost you \$50-100 per year. But it costs you more if you buy a lot of highly processed potato foods, such as chips, fries, or ready-made mashed potatoes. You can save much of this cost by growing some of your own spuds.

But if this doesn't look like much, there's another way in which you

can save more. Here's how: The average person needs to consume 2000 calories per day (give or take a few). Potatoes are capable of supplying that kind of energy to your body.

How are you getting those calories now? What foods are you eating to supply you with energy? How much are you paying for them? Could you replace some of this cost with potatoes that are much cheaper (and perhaps more nutritious) than what you're eating now?

Food prices can go up and down (usually up), and they vary in different regions, but here is a ballpark estimate for some commonly-consumed, grain-based food staples. Prices were calculated through personal research or [using numbers supplied by the government's Bureau of Labor Statistics](#). All are whole grain products, and I used price per pound numbers so these can be compared easily with potatoes.

Bread (whole wheat): \$2.02/pound
Spaghetti and macaroni noodles: \$1.31
Brown rice: \$1.59
Corn, frozen: \$2.50
Potatoes: \$0.69 (your own potatoes: almost \$0)
Cheerios breakfast cereal: \$4.00

I don't know what you like to eat, but if you were to eat a homegrown baked potato once per week instead of a side of corn or two pieces of toast, you might well save some money. Of course, you will save much more if you replace one highly-processed meal with homegrown, home-cooked potatoes. Remember, cooking a potato is easy as putting it in the microwave for a few minutes, while making roasted potatoes, fries, or a casserole takes longer. Baked potatoes themselves are pretty bland, but add some chopped green onions, chives, shredded cheese, sour cream, yogurt and/or bacon bits, and you have a meal (I understand this costs more than just the potato, but not much more per meal). Here are some examples of what you might replace, and what costs you might save:

Lasagna meal (microwave): \$2.00-\$4.00 (replace one per week: save \$100-\$200/year)
Mac-and-cheese (microwave): \$1.66-\$3.50 (replace one per week: save \$86-\$182/year)
Steamed brown rice bowl: \$1.69 (replace one per week: save \$88/year)
Corn soufflé (microwave): \$3.92 (replace one per week: \$200/year)

So at the end of the day, saving money with potatoes is about making small lifestyle changes. As long as you are cooking your own food, even with a grain-based diet, your food costs should be pretty low already. The only way to save big money is to replace a processed meal with one based on homegrown food, which requires slightly more prep time. If you are willing to do this, even once or twice a week, you will save a lot of money. Having homegrown potatoes on hand makes the task pretty simple.

Potatoes and eggs are a natural combination for nutrition, providing you with balanced protein and nearly all of the nutrients your body needs. They taste great for breakfast and other meals: omelet and hash browns, fried eggs over mashed potatoes, poached eggs and roasted spuds. If you like growing potatoes, consider getting a couple of chickens for your backyard also. They can eat a lot of your kitchen scraps and provide you with manure which can be tossed in a composter and then used to grow your next round of potatoes! For a simple beginner's guide to raising chickens, please click this link to see my e-book, [Backyard Chickens for Beginners: Getting the Best Chickens, Choosing Coops, Feeding and Care, and Beating City Chicken Laws](#).

Chapter 2: Different Kinds of Potatoes

If you have only eaten store-bought potatoes in the past, then chances are you have only eaten a few different varieties of potatoes. There are many more you can grow at home, so get ready for some tasty treats! Here is an overview of some different categories of potatoes, explained by function. Examples of potato varieties are provided in each group.

Below these descriptions, I have also included more information on where to buy certified disease free seed potatoes. Many local nurseries order seed potatoes of the most popular varieties around planting time in early spring. Alternatively, you can use your own potatoes for seed (purchased at a grocery store or grown yourself the year before). However, there is a risk of contamination with soil diseases. You can avoid this issue by buying certified disease free potatoes, either every year or every few years. They are not too expensive.



Reds, golds, purples, and fingerlings

Fingerlings: These are elongated little potatoes which resemble fat fingers. Even though they are small, these are mature potatoes grown from special fingerling varieties. Their taste is very tender and they are often used by gourmet chefs. Fingerlings come in different colors, including yellow, pink, and purple. Common varieties include: Rose Finn, La Ratte, Russian Banana, Austrian Crescent, Swedish Peanut, Red Thumb, French Fingerling, and Purple Peruvian.

Baking (Floury) Potatoes: Starchy varieties of potato are perfect for mashing, baking, and making into French fries. Favorite bakers include: any of the Russet types, Idaho, Cal White, Goldrush, Red Pontiac, Norkotah, All Blue, Mozart, and Snow White.

Boiling Potatoes: Waxy varieties of potato have more moisture and sugar than the baking types. They can be boiled, roasted, or barbecued. They will hold their shape well in soup, casserole, and potato salad. Good choices here include: Red Norland, Caribe, Yellow Finn, Charlotte, Maris Piper, and any of the Fingerlings mentioned above.

All Purpose Potatoes: These varieties can be boiled, mashed, fried, or baked. Some of the best-tasting potatoes are in this category: Kennebec, Yukon Gold, Purple Viking, Klondike Rose, Bintje, Salem, and German Butterball.

Best-Tasting Potatoes: This is a matter of personal preference, but some varieties are clear winners. Bintje is the world's most widely grown potato, a white variety that makes flavorful fries. La Ratte Fingerlings have been a longtime favorite of gourmet chefs. For those who love the robust flavor of red-skinned potatoes, Red Norland is hard to beat, but it is not the only red potato with great flavor. Yukon Gold, a very tasty potato that has been widely available in

supermarkets, has justifiably gained a large following for its soft creaminess. For home gardeners, German Butterball often comes out on top. Some growers who have tasted their own homegrown German Butterball spuds have vowed they will never again grow or eat another potato. There are a growing number of other Butterball varieties available also.

New Potatoes (Baby Potatoes): New potatoes are small spuds that are picked before maturity. They usually measure only two or three inches in diameter. They have a fresh, tender taste, and can be cooked and eaten whole, since their skins have not had a chance to harden. New potatoes are best harvested around the time that your potato plants begin to flower, or just after the green foliage has peaked, before it begins to wither and turn brown. If you see the leaves begin to wither, you can either pick all your little potatoes at that time or you can reach down and steal a few new potatoes, letting the others continue to grow as the plant transfers its energy to the growing tubers.



Spuds picked early are deliciously tender

Purple (“Blue”) Potatoes: Purple potatoes are a novelty and have become much more widely available in recent years. They make great visual presentations and are a nice addition to a “rainbow” potato dish. I have never found one that I like to eat as much as some of the lighter colored or red potatoes, but purple potatoes are very healthy

for you. Research has shown that purple-fleshed potatoes have twice as many antioxidants as light-colored potatoes. Adirondack Blue, All Blue, Purple Majesty, and Purple Peruvian are some good examples. Don't be fooled by Viking Purple, which is purple on the outside but bright white inside.

Rainbow Mix: Try growing a mix of different colors. Pick anything from the purple category above, all of which are stunningly dark. For some red/pink flair, try All Red or Mountain Rose (which have pink skin AND mostly pink flesh) or French Fingerling, which has pink skin plus streaks in its white flesh. Then pick any yellow-fleshed potato, such as Charlotte, Carola, or Desiree (pink skin, yellow flesh). And throw in a white spud like Early Ohio, Sunrise, or Anoka. The brightest white flesh often can be found on potatoes with colored skins, such as Cherry Red, Red Dale, or Viking. And of course, you could sneak in an orange-fleshed sweet potato...

Early, Mid-Season, and Late Potatoes

Early potatoes are varieties that mature in shorter periods of time, generally around 60-80 days. They can be grown in short season climates, but do not keep well because they often have tender skins and high moisture content. Examples include: Caribe, Red Dale, Red Norland, Yukon Gold, Russet Norkotah, and Cal White (which holds the record for heaviest commercial yields).

Mid-season varieties take 80-100 days to mature. Members of this category share some of the characteristics of both early and late season spuds. The first fingerling to mature, Russian Banana, fits in this category. Other examples include: Katahdin, Anoka, German Butterball, Purple Majesty, Kennebec, Desiree, and Red Pontiac (the best red potato for long term storage).

Late potatoes are those that need a long growing season (100 days or more) to mature, such as Bintje, Yellow Finn, Rio Grande Russet, and All Blue. They tend to be better keepers and thus can be kept in storage for many months.

Where to Buy Seed Potatoes

Local nurseries usually have some seed potatoes available in early spring. These are the small, sprouting potatoes we use to grow spud plants. If you want more variety, buy your seed potatoes online. Order in the wintertime for the best selection; potatoes are normally shipped

in March or April. Even if they arrive early, they will keep just fine in a cool location until you are ready to plant in the springtime. Here are some highly reputable sources of certified disease-free potatoes. Some of these offer organic choices as well.

1. Irish Eyes Garden Seeds: <http://irisheyesgardenseeds.com>
2. Potato Garden (formerly Ronniger Potato Farm and Milk Ranch Specialty Potatoes, which combined forces): www.potatogarden.com
3. Maine Potato Lady: www.mainepotatolady.com
4. Fedco Seeds' Moose Tubers: www.fedcoseeds.com/moose.htm
5. Territorial Seed Company: www.territorialseed.com

Chapter 3: Growing Potatoes in Containers, Raised Beds, and Traditional Rows

Potatoes can grow in anything that holds soil or mulch. An old bathtub, an old tire, or an old suitcase are examples of re-purposed items that gardeners have filled with soil to grow potatoes. You can grow potatoes in the ground in garden rows, as generations before us have done. You can grow them in raised beds, which tend to improve the productivity of every garden plant, potatoes included. Or you can grow them in any sort of container that holds enough soil volume.

Let's start by discussing containers. I have written several books and articles on growing vegetables, fruits, and berries in the home garden. For all of these crops, I strongly recommend putting them in raised beds if at all possible. Raised beds are my #1 choice because their deep, loose soil is a real benefit to the plants. I have never written anything where I recommended ground beds or containers over raised beds. Until now.

With potatoes, I am breaking with tradition to recommend containers as the best growing option. This recommendation is not only for people with apartments and no yard space; containers are best for potatoes anywhere. Believe it or not, containers just grow more potatoes. You will not get as many taters from either garden beds or raised beds as you will get from containers.

This is wonderful news for small space gardeners, because containers may be your only option. For everyone else, even if you have acres of

land to farm, you may want to consider growing spuds in containers. Potatoes grown in containers will give you a bigger reward for your time and trouble, and they're the easiest spuds to harvest. That said, we will cover all three growing options here: containers, garden beds, raised beds. Let's start with containers.

Growing Potatoes in Containers

I have no green thumb when it comes to potatoes. I often put them in containers on the patio and then forget to water them for periods of time. And these potato containers sit on a windswept patio, taking a direct hit from strong coastal gusts that have outmatched many other plants. Yet I routinely harvest 10-14 pounds of potatoes from each of the 10-gallon containers they grow in.

Each of these containers holds less than two cubic feet of soil. If you took this same amount of soil and spread it on the ground, you would be very lucky to harvest 5-7 pounds of potatoes from it (which would be an amazing yield). How is it that I regularly harvest twice that quantity of spuds from similarly sized containers?

The secret is to use the right kind of container: a fabric pot or plastic grow bag works best. These containers have started popping up all over the place at nurseries, some of them with names like "potato grow bag" or "tomato grow bag". Their growing popularity is well deserved.

Fabric pots are made from a long-lasting cloth that is sown in the shape of a round cylinder. Most growing bags are made from woven plastic in the shape of either a round cylinder or deep shopping bag. A few of them include handles for hanging or carrying, while others feature a Velcro-secured side panel that opens for simple potato harvesting. If you have some extra burlap sacks, these could be filled with soil and used with a similar effect.

The most important feature of these pots/bags is that the cloth is porous. There are lots of tiny holes on the sides and bottom to let in air. When the roots of most plants encounter air, they stop, turn, and try another direction. This is known as root pruning or air pruning. Potato plants' roots branch out when they hit the air, extending the root system downward and creating more space for tuber growth. With potatoes, having more roots means harvesting more potatoes underground.

These pots/bags are usually dark in color, black or green, which allows the soil to warm up more quickly each day. This speeds plants' growth, even in cool spring and fall weather. But unlike some other kinds of pots, fabric pots and plastic growing bags do not overheat easily. Those same porous holes that prune the roots also keep the soil aerated. Good soil aeration is hugely important for the roots of many plants, especially potatoes, which produce better in loose soil than compacted soil.

It all adds up to a winning combination for these fabric pots and plastic grow bags. They provide the ideal environment for growing potatoes, and bags can be reused time and time again. If you cannot find either of these at a local nursery, order some online. Here are some good suppliers.

Smart Pots: The 10 and 15 gallon sizes are perfect for patios, balconies, rooftops, and decks. There are [a variety of different fabric pots and plastic grow bags sold on Amazon](#). The company that makes the fabric pots also retails them on their own site here: <http://www.smartpots.com>.

Grow Bags from Gardeners Supply: This company always carries the trendiest new garden containers. They offer an extensive selection of grow bags for planting potatoes, tomatoes, salad greens, and herbs (all these crops can grow in them, but none of the others outperform the way that potatoes do).

Park Seed: Retailers the plastic potato grow bags as well.

Alternatively, just try running an online search for “potato grow bags” and you will see plenty of other buying options.

Growing Potatoes in Raised Beds and Garden Rows

Potatoes will grow just fine in either garden rows or raised beds, but the ones grown in raised beds will be more productive. That is because the soil is deep, loose, and probably of richer quality than what is under your garden. All these factors favor more potato production.

But if you have your heart set on raising spuds in traditional rows, then I won't stop you. There is something very fulfilling about growing plants in the native soil of your own yard. And you will be joining generations of people who have grown their own food the

traditional way.

The practice of growing spuds in rows and raised beds is about the same. Since we will cover planting and care of potatoes in the next two chapters, I will focus this section on what you need to know about gardening in rows and in raised beds.

Garden Rows

There are two major benefits of row gardening as well as some downsides. First, there is no major cost associated with row gardening, such as there would be if you purchased containers or building materials for raised beds. If you have decent soil in your yard, you can just plant your potatoes and start growing. Your productivity will be better if you prepare the soil first, and this can cost a few dollars for some good soil amendments. But even with this, your overall startup cost will be either free or very cheap.

The second major benefit with row gardening is that your plants have access to the water and minerals that occur in your soil. Deep rooted plants can continue drawing moisture from ground soil for a long time, whereas containers and raised beds dry out much more quickly than most garden soils. And the plants are not reliant on you to provide 100% of their nutritional requirements, since they can draw some minerals from the ground.

If you are starting a garden in a part of the yard that has never been used to make beds before, then you will need to dig up the soil and prepare it. First, mow any grass or weed as low as you can. Mark off the area you wish to use and the proper size of beds. These can be any length that fits your space, and any width from 1-3.5 feet. With wider rows, you are preparing a larger growing area for plants, and therefore they should be happier and more productive. Yet they should not be too wide that you cannot reach the very middle of the bed to plant, fertilize, weed, tend, or harvest there. Mark the intended beds with chalk, string laid on the ground, or stakes in the four corners.

Crowding plants does not improve their production. As discussed in [the next chapter](#), proper potato plant spacing is about 12 inches apart in the row. Leave at least 30 inches between separate rows when measured from the row centers where the plants will grow.

Once you have your space marked off, use a shovel or spade to dig up

a chunk of soil that is 6-12 inches deep. If the top is covered with grass or weeds, try your best to scalp it and turn the weed side down. Then use the shovel or spade to break up the soil as well as possible. If your soil is light and easy to work, then you are fortunate. If it has a lot of sand or clay in it, then you will need to amend it by working in plenty of organic matter, such as compost, manure, leaves, peat, or grass clippings. If it has lots of rocks or is pure clay, then you may want to consider investing in some containers or building your garden upwards (with a raised bed) rather than downwards. Repeat this process chunk by chunk, square foot by square foot, until you have dug up and loosened the soil in the whole bed area.

Most soil is usable and can be improved with organic matter. After digging up the soil and breaking it up, cover it with an inch or two of good compost, manure, or other organic matter. Gently dig this in to the top of the upturned soil. Water the soil well after you dig it, since it can dry out very quickly. Potatoes can be planted immediately in these new beds. Don't forget to fertilize and water regularly (which we will discuss shortly). Your potatoes will grow fine the first year, but probably better the second year after that, once the soil has had a chance to stabilize and incorporate the organic matter you have added.

Digging beds is hard work. I can make it even harder for you if you would like to create more productive rows with deeper soil. When you dig up the soil, rather than replacing the scoopfuls of soil in the same place, remove them to a wheelbarrow or place them on the ground to the side of the row area. Once the soil has been scooped out for 6-12 inches deep, dig up a second, lower layer to the same depth and put that soil to the side again. Throw a little compost, manure, or organic matter in the bottom of the trench if you want. Then place the first (top level) scoops of soil weed side down and break them up with the shovel. This layer will become your subsoil. Repeat with the deeper soil, which now goes on top and gets mixed with compost or organic matter to become your new topsoil. Your beds now have been improved to an impressive growing depth. Your plants will be happy.

If you are on a strict timetable and need to plant right away, you can dig hills rather than rows. (Hills are not to be confused with the process of "hilling" by mounding soil around plants, which will be described shortly.) Hills are just holes you dig up to loosen and improve the soil in a small space, say 1-2 square feet. Dig one per potato plant, following the plant spacing suggestions above.

Just think of a row as a solid line and a set of hills as a dotted line. You can dig a lot of these, amend them with compost, and plant them with potatoes pretty quickly. Once the plants are in the ground, you'll have plenty of time to connect these dots into rows, if that is your intention, by digging up and improving the soil in between them.

Raised Beds

With raised beds, you can prepare the soil beneath them as described above if you want maximum growing depth. But most of the work involves building the raised bed upwards. A raised bed is any mounded bed of improved soil that is maintained higher than the ground level. However, for purposes of my explanation, a raised bed also needs walls. This allows you to create deeper, uncompacted soil without the whole mess falling over.

Constructing raised beds is well worth the trouble and added expense. They will pay for themselves soon enough with improved yields of any garden crop you grow there. The startup cost depends upon the materials used and what you pay for them. You can build raised bed walls out of wood, stone, bricks, cinderblocks, tires, plastic, metal, or any support material you can find. You may decide to avoid using old tires or treated wood because of the possibility of toxins leeching into the soil, but from the research I've seen on both of these, the quantities of leached toxins should be very minimal. Raised beds can be built to any size that fits your space.

I have three raised beds and my backyard and four more in my front yard. Despite being a gardening writer, I am not much of a handyman when it comes to building things. But I purchased some rot resistant wood at my local big box store (redwood is cheapest in my region), cut them to size with a handsaw, and screwed them together into beds.

All my beds are rectangular, four feet by eight feet (4'x8'). First, I marked out the locations on the ground. Then I dug up the soil a bit. Next, I cut the wood to the right sizes, using four by four inch (4"x4") lumber for corner posts and flat two by eight inch (2"x8") or two by ten inch (2"x10") pieces for the walls. On later beds, I experimented by using thinner two by two inch (2"x2") corner posts, which seemed to work fine as well. I used 2-3 pieces of flat lumber on each side to make the beds 20-24 inches tall.

Here are two pictures of wooden raised beds. The first shows one of

my backyard beds which is growing potatoes and broccoli on half as well as a permanent planting of blueberries on the side. As you can see, the second half has been left to the chickens, which debug the bed, fertilize the soil and aerate it with their scratching. After a few months, I move the temporary fence to another raised bed for them to scratch in, planting a short time later in the one they improved. The second picture below shows a shallower raised bed built from four pieces of lumber on a lawn.





Rot resistant wood (such as cedar or redwood) performs well over time, while other wood can be painted or stained with a non toxic coating. New lumber can be expensive, so you can save a good deal of money by using old, repurposed wood. When someone remodels a house or replaces a fence in your area, see if you can get some old wood. I prefer screws to nails, since they hold the wood more tightly. I even spent more for vinyl coated screws that would not rust.

Bricks, cinderblocks, or stones can be used to make either a temporary or permanent raised bed. Before I was sure I wanted a raised bed in a particular place, I stacked some bricks and cinderblocks that I had salvaged. They created a loose box that I filled with soil. If you do this, you need to be careful about bricks falling out, which they do frequently, but if you need a quick bed for one season, this will do the trick. For a more permanent bed, you can get some mortar and build strong walls with stones, bricks, or cinderblocks.

If you have a patio or walkway space that's covered in concrete or stone, you can build a bed on top of it. If the area is flat, a raised bed filled with soil should not move, so you do not need to affix it permanently into the ground. I built one on my patio and used wood siding plus four by four inch (4"x4") corner posts. The bed just sits on top of the patio surface like a big box. To protect the surface and

prevent your soil from escaping, you can line the bottom with a few sheets of plastic and staple them to the insides of the walls or weigh them down with stones. Plastic sheeting is available at hardware stores.

The height matters. As you can see from the picture of the raised bed built on a lawn, the bed can be shallow and only raise the soil level by a few inches. It still helps, but potatoes are deep rooted enough that you still will need to vastly improve the subsoil beneath the bed. SO I would dig it up and prepare it as if I were growing in the ground soil directly, then build the bed on top and fill it with more soil or compost for growing.

On the other hand, a bed that is 12 inches or taller in height may not need access to the ground below. This is great for building on concrete, or if you have lousy soil filled with rocks or dominated by heavy clay. Just put in some plastic sheeting and/or a three inch layer of gravel at the bottom for a barrier. Other barriers at the bottom of the bed can include landscape fabric for weed suppression and poultry netting for preventing gophers, voles, and digging rodents from entering the bed. I cover the bottom of the bed, bring up the covering a few inches on each side, and staple it in with 14 mm staples.

There may be one more big expense involved in raised bed gardening. Once you build the bed, you have to fill it. You can use almost any combination of soil and compost as well as other ingredients like peat, sand, and low grade manure. The most cost effective mix that works well in raised beds is about 25% sand or perlite, 25-50% compost, and 25-50% peat moss. If you buy bag after bag of potting soil to fill larger beds, you will deplete your bank account, but this works fine for smaller beds. To fill a big void, it is more cost effective to order a delivery of planting mix or compost.

You can also start dumping in any other organic material you have in quantity, including herbicide free grass clippings, hedge trimmings, leaves, shredded paper, sawdust from untreated wood, layers of newspaper, coffee grounds, and kitchen waste. Bury this material under some soil or compost, keep it well watered, and it will all break down to give you some really good soil. You can plant in it right away and your potatoes will grow in it just fine, but the soil will be fabulous next year.

If potatoes are the only crop you plan to grow, you could even fill a raised bed or container with mulch (such as straw) instead of soil.

Whatever you use to fill your raised beds, you should know that the soil level will drop by several inches in the coming months as organic materials decompose and the soil settles in. You may need to keep filling your beds with more soil or mulch for the first year or so. And it just so happens that potato plants are the most productive when you keep adding more soil or mulch around them. The next chapter describes this method more fully.

Chapter 4: Planting and Hilling Potatoes

Planting

Potato plants grow from chunks of old potatoes. Have you ever seen the “eyes” on an old potato start to sprout? That’s what we put in the soil, and it grows up into a new plant. A large potato can be cut into several chunks, each one with an “eye” in it. With smaller potatoes, we just plant the whole potato.



Spuds beginning to sprout, perfect for seed potatoes

Potatoes grow best in the temperature range of 50-70 degrees (F). They have trouble in hot weather, so if you live in a hot summer climate, make sure to keep them well watered. You could even consider planting them in an area that gets some afternoon shade. Or you could cover them with a row cover or shade fabric. These are sold at nurseries in hot climate locations.

Since they like cool weather, potatoes make a great spring crop and

often a successful fall crop as well. Early varieties of potatoes require around 60-80 days to reach maturity, so it is entirely possible that you may be able to grow two or more crops per season. At the very least, you may be able to get some tender new potatoes from a late crop. In a cool maritime climate that never gets too hot or too cold, you can grow potatoes year-round with little or no frost protection.

Traditionally, the first planting day is around St. Patrick's Day in mid March. This makes it easy to remember, but you need to remember to buy your seed potatoes before then. Potatoes planted in March should be ready by July. You could plant a second crop in a different location as late as June 15 and harvest them as late as possible, around the time of your first frost. If you live in a short season climate where the first frost can come as early as October 1, then make sure to plant only early varieties of potatoes. And if you're not harvesting yet at that time, then make sure to cover your spuds with a nice, thick blanket of leaves or straw to protect them from the cold.

When you buy "seed potatoes" from a supplier, you are buying a bag of little potatoes. They are sold in one pound, two pound, five pound, or larger amounts. Some seed catalogs actually sell "potato seeds", which are a recent development, but these seeds produce a much less vigorous plant. The great thing about growing potatoes is that they store so much energy in those little tubers. Even a young plant that's run over with a lawnmower and loses all its leaves can grow back, because it can draw energy from the old potato under the soil until its leaves start converting energy from the sun. Even when you harvest potatoes, you often see that shriveled up old potato clinging to the vine underground; it still has a little energy and water in reserve.

Planting potatoes is pretty easy. Basically, we just bury the seed potato in the soil and it will grow, sending its stem shoot upwards and its roots downward. Space potato plantings about 12 inches apart from one another, and if you are planting in rows, then space rows at least 30 inches apart. You can plant the seed potato anywhere from 6-9 inches deep. In fact, you can plant it anywhere from 2-12 inches deep, but studies have shown that shallow potatoes suffer from frequent sunburn (and become toxic to eat), while deeper plantings result in less potato production.

Hilling

Though deeper planting is not better, many growers do achieve increased potato yields using a system called "hilling" or "trenching".

You can do this in the ground, in a raised bed, or even in containers. The idea is to take advantage of potato plants' growing vigor and trick them into producing more spuds. Tater plants only form tubers in the root area above where they are planted in the ground. But if you bury their stems in soil as they grow, and continue to create a "hill" of soil where they grow, these stems will root and the plant will continue to grow upward. Hilling creates more root space for tuber production between the top of the soil and the level where the seed potato was planted. A traditional garden row, when hilled, looks like this:



But you don't need to build a hill above ground if you start at a lower level. First, dig a trench or series of holes 12 inches deep and plant the seed potatoes at the bottom. Cover these with 3-4 inches of soil or mulch. In a few days, the plants will start to emerge. When you see six inches of stem showing above ground, surround the bottom few inches of the stems with some more soil or mulch (such as straw, untreated sawdust, or leaves). Do not cover any of the leaves. Make sure you water in the new soil or mulch.

Then when the plants grow six more inches of stem above ground, repeat the process by placing more soil or mulch around them. Again, they will grow. Theoretically, you can continue doing this many more times (especially with late season varieties). But if you start the potatoes in a trench 12 inches deep, you will reach the surrounding soil level after two or three applications of soil/mulch. With hilling, the plants will produce many more potatoes in these top few inches of material.

Chapter 5: Soil, Fertilization, and Watering Potatoes

Good Soil or Mulch for Potatoes

Potatoes will grow in many kinds of soil. They will produce a few spuds even in poor soil. But to get productive yields of potatoes, they need good soil. Aim for a soil that is slightly on the acidic side, which is true of most garden soils. If you are growing your spuds in the ground, or if you have filled containers or raised beds with native soil, mix in some organic matter. Here, the term “organic” does not mean pesticide-free; it refers to material created by living plants or animals. Compost, aged manure, leaf litter, shredded paper, untreated sawdust, and lawn clippings are all great examples of organic matter that can be mixed into the soil to improve its health and structure.

Having plenty of organic matter in the soil ensures that it will retain more moisture, while also loosening the soil so that water and air flow to the plants’ roots. Organic matter also decomposes slowly in the soil, nourishing an important community of beneficial organisms that provide nutrients for plants and improve their disease immunity. And it keeps the soil slightly acidic, which is what potatoes (and most plants) prefer.

You don’t even need soil to grow spuds. Potatoes will grow fine in layered newspaper, straw, shredded paper, untreated sawdust, or fallen leaves (let’s call these materials “mulch”). Plants need soil for physical support and nutrition. Potatoes can get the physical support they need from mulch, but they cannot derive much nutrition from it. So they’ll only grow in mulch if you supply them with all the nutrients they need. I recommend sprinkling some balanced organic fertilizer into the soil and watering it in. Also, please see [the Bonus chapter](#) which contains an additional fertilizing suggestion. You need to feed plants grown in soil, also, but they are capable of finding some soil minerals on their own.



Potato plant, above and below the soil

Feeding Your Plants

Feed potatoes by applying some balanced organic fertilizer to the soil. Here, the term “organic” refers to a product that is pesticide-free and does not contain chemically-synthesized ingredients. Organic fertilizers are made from whole foods which nourish the plants and improve the health of the soil. These can include ingredients like seed meal, aged poultry manure, feather meal, rock phosphate, bone meal, wood ash, or kelp meal.

Most nurseries and garden centers sell at least one brand of organic fertilizer. Large nationally-distributed brand names of organic fertilizers include Espoma, Dr. Earth, and Down To Earth, though you may find a good regional alternative as well. Any all-purpose garden or vegetable fertilizer (e.g. “Organic Vegetable Food”) will do just fine, including any product that features tomatoes in its name or picture (e.g. “Tomato Garden Fertilizer”). Tomatoes are the most popular home gardening crop, and they are close relatives of potatoes, so their nutritional needs are similar.

All fertilizers have a set of three numbers printed on their bags, boxes, or labels. The numbers refer to the relative quantities of the three major plant nutrients: nitrogen (N), phosphate (phosphorus) (P), and potash (potassium) (K). A balanced fertilizer, such as one labeled with an N-P-K number of “5-5-5”, is about right for potatoes, but do not

worry if you cannot find one with those exact ratios. A “bulb and bloom” fertilizer with less nitrogen and higher levels of phosphate and potash (e.g. 3-6-6) also works well for potatoes grown in a soil that’s rich in organic matter. Potatoes need some nitrogen, and if you hill them aggressively they will use more, but too much nitrogen will result in excess leaf growth at the expense of potato tubers.



Organic vegetable fertilizer (5-7-3)

Keeping Your Potatoes Watered

Keep your potatoes well watered. At least once a week (and more often in hot or dry weather), give them a deep soaking. They need about an inch of water per week, equivalent to perhaps 3-5 gallons per plant, though the actual amount will depend on your climate and soil. The water needs to penetrate down to the root system, not just moisten the top inch or two of soil. A deep watering is best accomplished with a slow drip irrigation system, soaker hose, or sprinkler (rather than by dumping a whole bucket of water on the plants all at once, which tends to create runoff).

You can minimize the need to water by mulching your potatoes. Straw, leaves, shredded paper, coconut coir, and cocoa bean hulls

make great top mulches. Put a blanket of at least 3-4 inches of mulch on top of your soil to seal in the moisture and prevent evaporation; this can reduce your need to water by as much as 50-75%.

To determine if your plants need water, stick a finger into the soil. If the soil is dry an inch or two down, water it well. If you are growing your potatoes in organic matter mulch rather than soil (a method described in the previous chapter), then you will need to water more frequently at first, until the material absorbs some water. This material can dry out pretty quickly at first, but over time it will retain more moisture than typical soil.

Wet leaves are the culprit behind many leaf diseases. You can avoid this by watering in the morning, which will allow the leaves to dry out in the sun. Alternatively, watering with drip irrigation or a soaker hose delivers the water at the soil level, keeping the leaves mostly dry.

Increase watering by 50% when your potato plants begin to flower or when they have developed a large amount of green leafy foliage. This is the time when potato plants put their energy into growing the tubers. This growth stage requires more water if you want to harvest big potatoes.

At the end of the growing season, when the leaves wilt and start to turn brown, you can stop watering. The potatoes under the soil will develop tougher skins at this time, which will help increase their storage life. You also want the soil to be pretty dry when you harvest your spuds, because wet soil is harder to work with and it tends to stick to the potatoes.

Chapter 6: Harvesting

Now comes the fun part of digging for gold (or white, red, or purple). Once the potatoes are ready and the soil is fairly dry, simply dig them up. If you are growing in a container, another option is just to turn it over and dump out the soil, spreading this out on the ground so that potatoes are easy to see and pick out. When I do this on a patio, I generally use a covering such as some overlapped sheets of newspaper, which simplifies cleanup. When the kids harvest potatoes from containers, we use scoop-shaped trowels to dig out the soil, keeping two buckets nearby: one for the soil scoopings, and another to carry the potatoes.

To pick potatoes from a garden row or raised bed, you need a tool to

dig the soil. Most people use shovels or spades for this. The best tool is a pitchfork (though not all urban gardeners have one). You can sink the fork into the soil beside the potato plants, push it towards and under the plants, and then pull any spuds upward. The fork tines offer very little resistance in the soil, allowing you to essentially filter it for potato tubers.

Harvesting potatoes with a shovel is clumsier, since the soil moves with it. To use a shovel effectively, you need to take slow, gentle scoops, being careful not to slice any potatoes in half. When using a shovel for this, I break up the bed into imaginary grid segments of one square foot apiece, digging up one at a time until the whole bed is completed. I slowly dump the soil out of the shovel on the side of the bed, picking out spuds as they appear.

If you have more time and patience, you can use a trowel and conduct a slower, archaeological excavation of the soil around the potatoes. This method probably ensures that you will not impale any spuds with your tool, but it seems to take forever in a large bed. The trowel is a better tool to use with containers, which have less soil volume.

As described [in Chapter 2](#), new potatoes should be picked earlier, around the time that plants flower. You can either harvest all the spuds at this time, digging up the bed or emptying the container, or you can selectively “steal” a few spuds while allowing the plants and their remaining tubers to continue growing until maturity. To steal a few new potatoes, reach your hands into the soil under the plants and feel for some tubers. Gently pull them off the roots without pulling up the whole plant, which can be left to continue growing. New potatoes are tender and do not need to be peeled, but they won’t keep very long: use them right away and enjoy!

Chapter 7: Storing Potatoes for Later Use

Late-maturing potatoes store the best. This also means you may be harvesting them as the weather turns cold. If frost comes before you can harvest, cover the potatoes with a blanket of mulch, such as leaves or straw, to protect them. Once you pick the potatoes, do not wash them. Unwashed potatoes store better.

The best place to store your potatoes will vary. A cool, dry root cellar is ideal. For most of us, a pantry, garage, or storage space with good air circulation is the best we can do. Ideal storage temperatures for potatoes are in the range of 45-55 F degrees, though anywhere from

40-60 degrees is acceptable for shorter periods. Do not put potatoes in the refrigerator unless you want them to become sweeter; the starches may convert to sugars in cold temperatures.

Before storing potatoes, inspect them and remove any tubers that have cuts or blemishes. These you can trim and eat immediately, if parts of them are still good. Store your spuds in paper bags, potato/onion mesh bags, or cardboard boxes. These materials breathe well, which is important, whereas potatoes stored in plastic bags become too humid and rot. A company called Orka makes [these cloth bags that work well to store potatoes, onions, and root vegetables](#); they also save space since you can hang them from a hook.



Hanging storage bags for potatoes, onions, and root vegetables

Once upon a time, people could not get what they needed at a supermarket and had to store root vegetables to feed the family during winter. Those without root cellars often used a method called a storage clamp. Large clamps are still used in the agricultural industry to “warehouse” root crops outdoors until they are ready for market.

To make a clamp, you choose a dry part of the yard (or the side of a hill), dig a big hole, and line it with a thick layer of straw or shredded paper. Place one layer of potatoes or root vegetables on the straw, packed loosely to allow for air circulation. Cover this with another

layer of the straw or shredded paper. You could use sand or sawdust just as easily. Place another layer of potatoes on top, cover it again, and repeat until you have filled most of the hole. Finally, cover it with a thick layer of straw on top, which you can hold in place with some scrap wood or stones. Take out a few potatoes as you need to use them, starting with the top layer and working downward.

A storage clamp works best if you have a large quantity of vegetables to store over the winter, particularly potatoes, onions, and root vegetables. This method also leaves your food vulnerable to soil-based pests such as gophers, voles, or digging rats. You might be able to strengthen your clamp by lining it first with sharp gravel and then straw, then covering the top with a tough piece of wood that is drilled with small air holes and heavily weighted down with stones or cinderblocks. Another option is to take an old refrigerator or barrel and bury it most of the way in the hole, layering and covering as you would with an open clamp. On a smaller scale, it probably makes more sense just to store a few pounds of potatoes in a cardboard box or paper bag in your home.

Wherever you put them, cover your potatoes well to block out any sunlight, which causes tubers to turn green and become toxic. As you select potatoes from storage to cook and eat, make a quick inspection to ensure there are no shriveled or rotten spuds in storage. If you find any, remove them.

Bonus Chapter: Two Secret Tips for Getting More (and More Delicious) Potatoes

If you put some seed potatoes in the ground and keep the plants watered as they grow, you *will* harvest some delicious homegrown potatoes. Potato plants are prolific enough that they do not need much care and are not too particular about soil. You will get a few pounds of potatoes, which probably will taste better than anything you have bought at the grocery store.

But if you treat them really well, you'll get many more potatoes, which will taste even better. What if you could double or triple your yield? And what if you could ensure that those spuds taste so good they are fit to be served at a gourmet restaurant? This final bonus chapter contains three suggestions for dramatically increasing your yield and ensuring that your plants grow the best tasting potatoes.

Secret Tip #1: Grow Potatoes Vertically for an Amazing Yield in a

Very Small Space

Remember the chapter on hilling? Potatoes will keep growing upwards when you mound the soil around their stems. These stems root in the ground, creating more space for the formation of spuds underground. “Hilling” potatoes will dramatically increase your yield.

What if you grew potatoes in a very vertical environment, planting some late maturing potatoes at the beginning of the year, and just kept on hilling them again and again? How high would they grow and how many potatoes would they produce from a few square feet of growing space? The answers are 3-4 feet and 25-100 pounds.

Greg Lutovsky, owner of Irish Eyes Garden Seeds in Washington State, came up with [plans for a box that can grow 100 pounds of potatoes](#) in just four (4) square feet of horizontal growing space ([click the link](#) for these plans). He personally grew 81 pounds of potatoes using this box (or “cage”), while a friend of his grew 124 pounds. These plans have been reported on in several media outlets, including the [Denver Post](#) and [Seattle Times](#).

The basic idea is to build a frame for a vertical box two feet by two feet (2'x2') wide. The frame extends 3-4 feet high. You plant the potatoes in soil at the bottom and begin “hilling” by mounding the soil around the growing stems. As the soil and plant level rises, you also fill in the walls by nailing or screwing in a new board on the side each time. Eventually, the plants and box sides will reach the top. You can begin harvesting potatoes from the bottom by removing one of the lower wood slats and digging them out, while those on top will continue growing until all potatoes are mature. This design has the potential for a truly enormous harvest.



Figure 2



Figure 3

The [Seattle Times](#) followed a gardener's attempt to construct the box and grow some potatoes, which yielded only 25 pounds rather than 100. A yield of 25 pounds still is far more than you could ever grow in the same amount of space using traditional methods. But apparently, the yield was that low because they grew the wrong variety. Only vigorous, late-maturing potatoes will produce more heavily using this method. Mr. Lutovsky recommends only using Yellow Finn, Indian Pit, Red Pontiac, or fingerling types.

If that plan is too difficult, you can try another one that I prefer. I did

not invent it, and there are as many examples of this idea all over the Internet as there are references to the Lutovsky box. I am merely passing the concept along to you and telling you that it works, because I have used it successfully myself.

The plan is this: Grow your spuds in a garbage can. Find a nice tall one and wash it out really, really well. I mean that, since you'll be growing a food crop. Better yet, buy a brand new container for this.

I bought a 32 gallon Rubbermaid brand plastic garbage can for \$18 at a hardware store. I washed it out and drilled about 20 evenly spaced holes in the sides and a few more in the bottom. I then put a few shovelfuls of loose, composty soil at the bottom to a height of about six inches, placed several pieces of seed potatoes inside, and covered these with 3-4 more inches of soil which I sprinkled with organic fertilizer. As the potatoes grew, I covered part of the emerging stem each time (Mr. Lutovsky says to cover only $\frac{1}{4}$ of the stem each time, but I just don't get out to the garden often enough to do that much regular hilling). I picked 42 pounds of taters from my garbage bucket, and I must have forgotten to water it for at least a couple of weeks during the worst of the summer, which no doubt cost me some additional spuds.

Another approach, which other gardeners have reported works well, is to cut out the bottom of the plastic garbage can and plant your seed potatoes in the ground soil, surrounding them with the rest of the garbage can (which might need some stakes to hold it in place). In all honesty, I would recommend this method above mine, as it gives you even more growing height, provided that you plant the potatoes (and garbage can) on some nice, loose, fertile soil. The only reason I don't do it this way is that I have gophers below. I have not tried it yet on top of a raised bed, but that should work quite nicely.

Whether you plant the seed potatoes in the ground or near the bottom of a vertical container, this method should yield a very large harvest. But do not forget you also need to fertilize the plants and keep them well watered throughout the growing season. You could experiment with a fertilizer that is slightly higher than usual in nitrogen, since this involves a great deal of stem growth. I would look for something with an N-P-K number starting with 7 or so, or else supplement with some feather meal, cottonseed meal, or liquid fish fertilizer (I know, it sounds yucky, but it really works).

Speaking of a maritime ingredient that really works, check out this

next Secret Tip for a way to boost your potato plants' growth rate and put you on your way to a harvest of the most delicious tasting spuds you've ever had.

Secret Tip #2: Nourish Your Plants with a Special Treat

Plants love to be pampered. It is one thing to give them their minimum nutritional requirements via fertilizer. You can live on food rations, too. But if you give them some special treats just like a child or a pet, they will show you some real love!

Tomatoes are America's favorite homegrown crop, and with good reason. But potatoes have become very popular for home growing as well due to the energy and food value they deliver. Once you have tasted your own homegrown potatoes from varieties you will never find in the stores, you'll be hooked on growing them at home also.

Both potatoes and tomatoes are from the same family and have similar nutritional needs. Basically, both of them are very simple plants to grow at home. But if you want the tastiest and most productive tomatoes and potatoes, you must be prepared to take one or two additional steps. With the huge popularity and all the expert research that exists on growing tomatoes, it took me a whole booklet to explain just five tips for growing bigger and better tomatoes. For potatoes, I am condensing it a bit. If there is just *one* extra step you should take to ensure more productive and tastier spuds, this is it: spray the plants' leaves with diluted kelp extract.

Kelp, *Ascophyllum nodosum*, is a huge seaweed that grows near the coast in cool ocean waters. Perhaps you have seen massive strands of kelp wash up on a beach or you have visited an aquarium with a breathtaking kelp forest exhibit like the one in the picture below. The exhibit at the Monterey Bay Aquarium in California has kelp strands that reach three stories high, while the picture below shows a tank at Two Oceans Aquarium in Capetown, South Africa. Kelp is one of the fastest growing plants in the world, able to grow as much as *four feet* in a single day under the right conditions.



Not surprisingly, the plant contains very high levels of natural growth stimulants. While you can harvest kelp at the beach for your use in the garden, it is not as potent as the concentrated forms you can buy. Kelp also provides a good source of potassium (potash) and trace minerals for potatoes, which they very much need and may not get from your soil or fertilizer. Giving your plants a kelp treat will improve both potato productivity and flavor.

[Several kelp products are available at nurseries and online stores](#) for use in the home garden. Liquid kelp extract can be diluted and sprayed on your plants' leaves as a foliar fertilizer. The plants are able to take up nutrients that are dissolved in water and applied to their leaves. Kelp meal powder can be added to your soil directly or mixed in water if it is soluble. I use the liquid extract, following the label directions on the back to dilute it in water. Then I spray it on the plant leaves at least once a month. I use either a large garden sprayer (like the kind used for spraying chemicals) or a small hand spray bottle. Both are available at nurseries. Alternatively, you can just dump some kelpy water at the base of the plant, which is called a soil drench.

Some believe that kelp extract makes a plant much healthier and less susceptible to disease. I don't know whether that's true, but it would not surprise me. I just know that regularly spraying your tomato plants with this stuff is the next best thing to feeding them sugar cubes (just kidding). And for potatoes, it seems to really increase plant

growth and result in more tubers. There is no scientific evidence that these spuds are better tasting, but I have my opinion. Try this tip, then taste some potatoes for yourself. Let me know what you think!

How to Grow Tomatoes, Peppers, and Eggplant: Planting and Growing Organic Heirloom Tomatoes, Sweet Bell Peppers, Chili Peppers, and Gourmet Eggplant

By R.J. Ruppenthal, Attorney/Professor/Garden Writer

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Chapter 1: Growing Your Own Tomatoes, Peppers, and Eggplants: The World's Favorite Homegrown Vegetables

“Homegrown tomatoes, homegrown tomatoes.

What would life be without homegrown tomatoes?

Only two things money can't buy.

That's true love and homegrown tomatoes.” –John Denver

Homegrown tomatoes, peppers, and eggplants provide the true taste of summer. These three plants, which are closely related, thrive in warm summer weather and are simple to grow in most home gardens. Whether you have acres of land, just enough space for a few plants in the yard, or simply a container or two on your patio, balcony, deck, rooftop, or doorstep, then you can grow tomatoes, peppers, and eggplants.

This short book will show you how to grow organic tomatoes, peppers, and eggplants. We will cover all the important things you need to know: how to prepare your garden space, plant your vegetables from seed or seedling, take good care of the plants (including proper feeding and watering), and harvest them for fresh use or storage. If you consider yourself a lazy gardener, then this is the perfect book for you, because I like to keep it simple. You will learn some simple techniques to cut down on your watering and weeding.

Tomatoes are the most popular homegrown food crop in the United States, Canada, the United Kingdom, and Australia, four countries which keep statistics on their hobby gardeners. In the U.S. and Canada, peppers are the second most popular homegrown vegetable, and they even make the Top 10 list in the cool climate of Britain. In China, eggplants and chili peppers are among the most popular foods to plant at home.

From Hungary to Pakistan, Argentina to Italy, and Kenya to Vietnam, the tomato family vegetables are planted and enjoyed by billions of people. In developing countries, where many people still grow large amounts of their own food, tomatoes, peppers, and eggplants remain important crops. Nearly every country in the world has a national dish that features one or more of these vegetables.

You will never buy a tomato, pepper, or eggplant that's as tasty as one you can grow at home. Homegrown tomatoes are juicier, sweeter, and more flavorful than anything at the store. Commercial ("plastic") tomatoes are grown from varieties selected for durability and uniformity rather than taste. These are picked unripe so that they can be shipped for many miles to your local store. In contrast, a fully ripe homegrown tomato from your garden may not even make it to the kitchen without splitting! Mortgage Lifter, Cherokee Purple, Yellow Pear, Sungold, Green Zebra, Amish Paste, and Brandywine are just a few notables you can grow at home.

If you've never tasted homegrown peppers, you are in for a treat. Your local grocery store might sell bell peppers and one or two kinds of hot peppers, but as a home gardener, you will be able to plant any one of *hundreds* of different peppers: orange and purple bell peppers, sweet paprika peppers, dark red cherry peppers, Thai bird's eye peppers, Habanero and Ghost chilies with thermonuclear levels of heat, Poblano peppers, yellow pickling peppers, and many more. Even if you are growing a run-of-the-mill variety, you will find it has a deeper and fuller taste when grown by hand. Plus, your homegrown peppers will be completely organic.

Below is a picture of the naga bhut jolokia pepper from India (ghost chili). At 10,000 times spicier than Tabasco sauce, it is classified as one of the hottest peppers on the planet.



Eggplants are the third wheel in this trio of heat-loving summer vegetables. While they're nowhere near as popular as tomatoes or peppers, eggplants are closely related and have much the same growing requirements. So if you're planting the other two, then why not pop in a couple of eggplants as well? Whether you try the giant, black-purple ovals we slice up in America, the slightly smaller and more refined Italian varieties, the slender Chinese and Japanese eggplants (some of which are bright purple), bright red African eggplants, or the tiny southeast Asian eggplants that can be white, green, purple, or striped, there are many choices. Again, I think you will find homegrown eggplants more flavorful and enjoyable than store-bought food. Ratatouille, grilled vegetables, kebabs, and eggplant parmesan are mouthwatering dishes that combine all three of these summer vegetables.

By the way, tomatoes, peppers, and eggplants are “fruits” in a botanical sense, but most gardeners and cooks treat them as “vegetables”. In 1893, the U.S. Supreme Court determined that tomatoes are vegetables (and not fruits) for purposes of tariff regulations. I like thinking of them both ways, so I use both terms in this book.

Note: Since “tomatoes, peppers, and eggplants” and “tomato family vegetables” are long terms, I will abbreviate these vegetables from now on as “TEPs”. This will be easier for you to read, since you will be seeing that term again and again. Tomatoes + Eggplants + Peppers = TEPs!

Chapter 2: Starting with Seeds or Seedlings: How to Plant TEPs

Tomatoes, eggplants, and peppers (TEPs) are subtropical plants in the *Solanaceae* family. As their family name suggests, they love plenty of sunshine. Tomatoes and peppers originated in Central and South America, while eggplants were domesticated for the first time in India.

While all three plants can be grown in temperate climates (such as those in most of North America, Europe, Japan, Southern Australia and New Zealand), these cannot handle the frosty weather of early spring. In their native environments, TEP plants are perennials, meaning that each plant can live for many years. But most of us can grow them only as annuals in the warmer months of our calendar, because it's just too cold for them during the other months.

When grown as perennials in frost-free climates, some plants in this family can get truly huge. The Sungold tomato, a candy-sweet variety of orange cherry tomato, holds the record for the tallest tomato plant. Grown in a greenhouse in the United Kingdom, the record-setter reached 65 feet in length. The tree tomato at EPCOT in Florida, as shown in the picture below, produced 32,000 tomatoes from a single plant.



When to Plant

Since TEPs are sensitive to the cold, this means you cannot grow them outside in temperate locations until all danger of spring frost has passed. And you are better off waiting until the air and soil warm up a bit. TEP plants grow best when daytime temperatures reach 65 F degrees and nighttime temperatures stay above 50 F degrees (preferably above 55 F). For most gardeners in temperate climates, this will be mid-Spring or so.

When springtime comes, most of us gardeners cannot wait to get our summer vegetables in the ground. But often, it is better to wait until you are sure the weather has warmed sufficiently. I usually keep an eye on the weather forecasts around planting time and make sure to choose a week that is trending warmer. If a cold snap is on the way, wait another week.

There is no hurry. If you try the classic experiment with two tomato plants, planting one as soon as the weather is warm enough and planting the next one a month later, you might be surprised at the results. I know gardeners who have tried many variations on this, and unless the weather warms up very quickly, the results are pretty consistent. Plant #1 produces the first fruit, but only a few, and Plant #2 begins producing just a week or two later. Both plants bear most of their fruit around the same time, even though one plant had a month-long head start.

The moral of this story is: there's no rush. Let your neighbors start their gardens in borderline weather. You can wait an extra week or two, and perhaps even an extra month. Warmer weather means happier plants, less risk of leaf diseases, and faster growth.

A few gardeners put out their plants early and provide some means of protection from the elements. A small plant can be covered with a plastic dome, such as a converted plastic milk jug (with the bottom cut off) or [a garden cloche](#). Since water is a good temperature moderator, surrounding your plant with water may prevent it from experiencing the coldest temperatures. This is the theory behind [Wall O Water](#) and [Kozy Kote](#), two products which are available online and in many nurseries. Cold frames and miniature greenhouses provide similar protection on a larger scale.

Starting Seeds or Buying Seedlings

You can get a jump on your TEP plants by starting seeds indoors. The temperature indoors is usually closer to what these plants expect. Starting your seeds indoors will allow you to begin growing TEP plants 4-8 weeks before they need to be planted outdoors. By the time all danger of frost has passed, you will have healthy, robust seedlings ready to be planted in your garden. Of course, another option is to wait until the outdoor temperatures warm sufficiently to plant the seeds outdoors, letting the plants come up themselves. There is nothing wrong with this natural approach, though in some locations the plants will come up too late to ripen a crop by fall.

Starting your own seeds requires you to buy some tomato, pepper, and/or eggplant seeds and use small nursery seedling cell trays filled with soil (or planting medium). Alternatively, you can use a tray filled with soil blocks or small growing disks that are made from peat or coconut coir fiber. Smaller cells, blocks, or disks warm up more quickly, so they are preferable for the first few days.

Plant TEP seeds about ¼ inch deep in the soil or planting medium. They will take 5-14 days to germinate. At that point you will see the sprouts begin to emerge. In a week or two, before the plant outgrows this area, it can be “potted up” (planted into a larger pot). You can pot up each seedling either once or twice while it is indoors. A four-inch pot is a good final size of container for the seedling before it is planted in the garden. The main advantage of starting with a smaller pot/cell/disk is that it stays warmer and the plant grows more quickly. However, some gardeners just start the seeds in four inch pots and skip the “potting up” step.

Here is a picture of [a seed starting kit, which is available here](#). Seed companies and nurseries sell different versions, all of which work pretty well. This particular setup has a small plastic dome to increase humidity and encourage germination. It also has a lower tray, which can be filled with water.



Some people also use an electric heat mat under the seedling pots or tray. If your home is cool, then a heat mat can provide a nice, consistent temperature. Either the light or the heat mat or both can be plugged into a timer, if you choose. All of these supplies are available at nurseries or online. While you are there, grab a small spray bottle also; these make it easy to keep the little plants moist without flooding them.

Also, you will need a light source, which can be a sunny window or a grow light (fluorescent lights are cheapest and their light spectrum is pretty close to what young plants need, but the prices on LED grow lights are coming down also). A sunny window will need at least 6-8 hours of full sunlight each day, and you will need to turn the seedlings in the trays on a regular basis to prevent them from growing sideways towards the light. In the picture below, notice the angle of the seedlings in the plastic party cups on the left side.



Before moving your seedlings into the garden, there is one final step you must take. They have been pampered indoors and are not yet ready to face the elements. Hot sun or a strong breeze can kill them before they are properly “hardened off”, which is the process of getting them ready for the outdoors. Nursery-bought seedlings already are hardened off, but you will need to do this for any plants you start.

First, whenever you pass by your seedlings, blow on them. Do this only lightly at first, and then start blowing a little harder as they grow bigger to simulate an actual wind. Try to blow from different directions. It sounds silly, but this will make your plants grow much stronger than they would otherwise.

Second, in the last two weeks of the plants’ indoor life, start giving them a little outdoor time. Find a protected location that has some shade. Begin on a day that is not too hot, cold or windy, placing seedlings outdoors in the shade for 30 minutes. The next day, do this again and increase outdoor time to one hour. Then move them into half sun, a little more wind if there is any, and gradually increase their exposure to a few hours at a time. Finally, leave them outside overnight. After 1-2 weeks of this, your babies will be ready to leave the nest and be planted in the garden.

Starting your own seeds has two big benefits. First, you save a bit of money, assuming that you use your seed starting materials regularly so as to make those costs worthwhile. Second, planting from seed gives you a much wider selection of possible varieties to grow. If

the seed rack at your local nursery or garden center has a limited selection, then jump online. Here are some of my most trusted seed suppliers. I make no money from recommending them, but I find that their seeds are of the best possible quality, meaning that they germinate reliably and grow healthy plants.

1. [Johnny's Selected Seeds](http://www.johnnyseeds.com/). An employee owned company, Johnny's sets the standard for garden seeds. These folks test many varieties in their own trial gardens. If you live in the Northeast, mid-Atlantic, or Midwest, these seeds will be particularly well suited to your regions. I do not live in any of those regions, yet this is still my first stop. <http://www.johnnyseeds.com/>

2. [Park Seed](http://parkseed.com). Southern gardeners rejoice! Park Seed offers very reliable seeds of high quality which have tested well in their own gardens. This is an ideal seed source for anyone in southern states. They have a wonderful selection of TEP seeds, most of which should perform just as well in the Midwest and other warm summer locations. <http://parkseed.com>

3. [Southern Exposure Seed Exchange](http://www.southernexposure.com). Here is another good choice in the mid-Atlantic and southern states. With a nationwide network of growers, SESE offers many open-pollinated (OP) and organic varieties. <http://www.southernexposure.com>

4. [Baker Creek Heirloom Seeds](http://www.rareseeds.com) sells over 1400 varieties of heirloom seeds, including some treasured old varieties of tomatoes, hot and sweet peppers, and eggplants. Some of them include names like Red Cheese Peppers, Chocolate Habanero Chilies, Pritchard's Scarlet Topper Tomatoes, and Turkish Orange Eggplants. You won't find these seeds at the local store, and many of them are extremely rare plants. www.rareseeds.com

5. [Territorial Seed Company](http://www.territorialseed.com). Serving the Pacific Northwest, California, and the Rockies, Territorial is another terrific seed supplier which puts a lot of effort into developing and testing the best varieties. I have never gone wrong ordering from them. They have an excellent selection of fall vegetables as well, though not quite as extensive as Johnny's. Territorial's seeds are particularly well suited for anyone on the West Coast. <http://www.territorialseed.com>

6. [High Mowing Organic Seeds](#). This small Vermont company has built a successful business by growing and selling only organic seeds. They may not have as many choices as larger seed houses, but they also

offer some fun and interesting varieties. They pick the best ones which are most likely to succeed and give you some great recommendations. I have come to trust both their quality and their selection of varieties in each category. And I love supporting an all organic small business. <http://www.highmowingseeds.com>

7. **Pepper Joe's**. This is a small family business started by a guy who loves hot peppers. He offers some of the world's spiciest peppers as well as a good selection of other chili peppers, sweet peppers, and tomatoes. <http://www.pepperjoe.com>

Alternatively, you can save yourself the trouble and just buy seedlings at your local nursery around planting time. Most nurseries these days sell multiple tomato varieties, but they have fewer sweet peppers, chili peppers, and eggplants. Unless it is a really good nursery, they usually stock just one or two varieties of each.

There is no denying that buying seedlings is the easier way to go; you just pop those plants in the garden and they're off to the races. Look for seedlings that are not tall and leggy, but thick and bushy. These will be the healthiest plants.

Here is a picture of some different colored bell peppers. For the best selection, order your seeds online and start the plants yourself.



Planting and Growing Specifications for Tomatoes, Peppers, and Eggplants

- Planting: Plant seeds $\frac{1}{4}$ inch deep in loose, well-drained soil
- Spacing between plants: Space plants 2-3 feet apart (peppers, eggplants, and determinate tomatoes) and 3-4 feet apart (indeterminate tomatoes)
- Spacing between rows: Space rows 4-5 feet apart
- Temperature for Seed Germination: 70-90 F degrees
- Germination Time: 5-14 days
- Transplant Seedlings at: 4-8 weeks
- Watering: Full-sized plants need 1-2 inches of water each week (somewhere around a five-gallon bucketful of water, weekly, per plant). Size of plant, climate, soil type, and presence of mulch will affect actual amount.
- Fertilizing: Use balanced organic fertilizer (such as 5-5-5). Lower nitrogen fertilizers (where first number is lower) can also be used. Follow recommendations on fertilizer package at the time of planting, scratching the fertilizer into the top few inches of soil near base of plant. Water it in well.

Chapter 3: Where to Locate Your Garden; Dealing with Shade and Drainage Issues

Since TEPs are heat-loving subtropical plants, the best place for your garden is in a sunny location. Ideally, this location will receive at least 6-8 hours per day of full blast sunlight. While it is possible to grow other kinds of vegetables with some shade, TEPs are fruit-bearing plants which need a huge amount of light energy to produce their crop. Planting them at the base of a wall or fence, particularly one that faces south, will ensure that they stay warmer.

Sitting at the base of a wall that faces the sun, these container-grown chili peppers are enjoying lots of reflected light and heat.



If you have limited sunlight, then try the fastest-bearing varieties. Look for the “Days to Maturity” number on the seed packet or seedling label, which tells you how long it takes from planting until the first harvest. Quicker TEP varieties will have a number closer to 65 than 90 days. For tomatoes, I would encourage you to try small-fruited kinds like cherry and Roma tomatoes, since these fruit much more quickly than the giant beefsteak or slicer tomatoes. The larger the fruit, the more light energy it needs to develop. With the smaller ones, you are likely to get a crop even in partial shade.

Peppers and eggplant can be grown with a bit of shade also. With eggplant, try the Chinese and Japanese varieties, which (as with cherry tomatoes) are smaller and therefore quicker to mature than larger-sized varieties. For peppers, you can try chili peppers, banana peppers, and a category of sweet peppers known as gypsy peppers. In fact, while peppers like warm weather, they are a bit of an understory plant. Partial shade is not the kiss of death. In hot climates, all of

these TEP plants can benefit from some afternoon shade.

Also, when choosing your garden space, be sure to put your TEPs in an area that has well drained soil. While your plants will need plenty of water, they do not like wet feet. The soil should have enough sand or organic matter to enable it to dry out. Plant roots need oxygen as well as water, and they are unable to breathe when soaked in water. If you are not sure how well your soil drains, try this simple test: dig a hole about one foot deep and fill it with water. Come back in 30 minutes. If the water has drained out, then your soil is fine. If some water remains in the holes after 30 minutes, your soil does not drain well enough for a good garden.

Your soil may retain too much water if it is in a low-lying area or if it contains too much clay. Clay particles are much smaller than sand or silt, and they form a tight structure in the soil, which retains water. Clay soil can be amended by digging in generous amounts of organic matter, such as compost, aged manure, straw, or dry leaves. Mixing organic matter into the top 10-12 inches of the soil will improve its structure and make it more favorable for plants. If you have a serious drainage problem, then another great option is to use containers or raised beds (which are discussed in [Chapter 4](#) and [Chapter 5](#), respectively).

Here is a picture of a raised bed, which includes tomatoes, peppers, and eggplants. Raised beds virtually eliminate any problems with drainage or poor ground soil.



Chapter 4: Container Gardening in Small Spaces: Fresh Produce From Your Patio, Deck, Balcony, Rooftop, or Rafters

If you think you don't have the space for a vegetable garden, think again. With pots, tubs, buckets, boxes, and other containers, any hard surface becomes fair game. You can place a container or two on your patio, balcony, deck, rooftop, or doorstep. I wrote my first book, *Fresh Food From Small Spaces*, because I was frustrated at the lack of any written help for small space gardeners. These days, thanks to the local food growing movement, there is much more information out there.

Growing tomatoes, peppers, and eggplants in containers could not be simpler. TEPs are the stars of container gardening. Almost any pepper, eggplant, or determinate tomato plant can thrive in a container that is large enough to support it. While there are miniature varieties of these plants (such as patio tomatoes and some chili pepper plants), the smallest pot size I would use for most TEP plants would be five gallons. This is the size of a typical plastic bucket, though you are welcome to use a more attractive container than this.

Indeterminate tomato plants, which keep on growing until frost kills them, will run out of space pretty quickly in most containers. If the label on your seed packet or nursery seedling pot indicates an

indeterminate variety, you should plant it in a larger container, preferably at least 15 gallons. Your plant can handle a smaller container, and will still produce fruit from a stunted plant, but you run the risk of the plant's roots strangling themselves in the container. Better to plant indeterminates in the ground or in very large containers, and use the normal containers for growing peppers, eggplants, and determinate tomatoes.

As for what kind of container to use, just about any material and design will work. Make sure it has drainage holes at the base. Bear in mind that porous materials such as terra cotta and wood tend to dry out more quickly, while plants in plastic, metal, or glazed ceramic pots can get pretty hot inside. This is doubly true if the pots are dark in color, such as black or dark green, while white absorbs much less heat.

In cool climates and in places where summers are short, more heat can be a good thing. Your TEP plants will need every degree of extra temperature they can get. But in hot climates, especially on a hard surface like a patio or rooftop, those things can dry out and overheat in a few hours. If you expect high temperatures, then you might consider providing a source of afternoon shade and using containers that breath, such as wood or terra cotta.



Also, it is best not to place containers directly on top of hard surfaces like patios and walkways. Instead, use a spacer made from wood or a few flat rocks to keep your pots an inch or two off the hard surface. That way, your plants will be less exposed to wide temperature fluctuations and there will be more aeration under the roots.

There are two newer types of containers that work really well for TEP plants. The first kind is a self watering planter and the second is a fabric pot or plastic grow bag. If you've read my other books, you may

be familiar with both types of containers. I sing their praises often. Both kinds allow you to increase your productivity over traditional containers. In many cases, you can expect to harvest even more tomatoes, peppers, and eggplants from one of these pots than from a plant grown in the ground soil.

Self watering planters (SWPs) come in many shapes and sizes. The two classic SWPs which I recommend for tomato, eggplant, and pepper plants are the Earthbox and the Tomato Success Kit from Gardeners Supply Company. The basic design of these SWPs begins with a rectangular plastic tub that is roughly two feet long, one foot wide, and one foot high. A few inches above the bottom, there is a plastic screen that sits inside the tub, separating the soil above from a water reservoir below.





The soil (which actually is a planting mix that contains a lot of organic matter) has a small foot that sits in the water, wicking up moisture into the soil. The plants' roots drink what they need, and more is drawn up into the soil from below as they need it. You add water to a SWP by way of a pipe or tube in the corner, and there is a drainage hole near the base which releases extra water.

Lazy gardeners, pay attention! SWPs make it almost impossible to overwater, but they can save you a great deal of time. In typical summer weather, the 3-4 gallons of water in the reservoir might last from a few days to a full week. By the way, I consider myself a lazy gardener also. If there are simple ways to make things easier, why not take advantage of them? I love taking care of my plants, but I don't have time to go out there every day.

Most vegetable plants, including TEPs, absolutely thrive in self

watering planters. With the water coming up from below and fertilizer being applied on top (just scratch a few spoonfuls into the top few inches of the soil), the plants create a two-level root system. They also enjoy full aeration of their roots with the space below and the watering tube letting in plenty of oxygen. The end result is a nearly foolproof growing system that can survive on auto-pilot between watering. Plants grown in SWPs tend to be really happy and produce lots and lots of vegetables.

Fabric pots and grow bags are another good bet. I raved about these in my [How to Grow Potatoes](#) book, since they are the best choice for productive spuds. TEPs are in the same family as potatoes, and though they bear their crop above ground, they also respond well in fabric pots.

Fabric pots are made from a piece of synthetic felt, which is stitched up and usually creates a round, cylinder-shaped container. Because it is made of cloth, the sides and base are soft and only able to stand up when filled with soil. Usually dark in color, they heat the soil, yet the plants' roots can breathe well thanks to the thousands of small holes in the porous fabric. Therefore, the soil temperature remains on the warm side of moderate, just what you want for subtropical plants.

The holes in the fabric also have another important role. When the plant roots grow outward and encounter the air, they stop and branch out, most of them heading downwards. This so-called "air pruning" builds a stronger root system with a better-than-normal capability of nourishing the plant.

Frankly, I don't really understand the science behind it. I just know that certain kinds of plants really flourish in fabric pots, while others do not. Potatoes, tomatoes, peppers, and eggplants are among those that do very well.

Similarly, a lot of "grow bags" and "potato grow bags" have been popping up lately at nurseries and online. Some of the manufacturers and retailers also have a similar product for growing tomatoes, while a few even have a smaller bag for peppers and a shallow one for lettuce. When filled with soil, some of these are cylindrical while others are square or rectangular. In truth, you could put TEP plants in most of these grow bags (even the potato ones) and they would be quite happy there.

These grow bags tend to be made from woven or perforated plastic.

Therefore, they have lots of holes in the sides and their properties are similar to fabric pots. If you are short on space, some of these grow bags come with straps. You can hang them on a strong hook or over the end of a rafter. Here are some online sources for fabric pots and grow bags; many local nurseries sell them also.

Smart Pots: The 10 and 15 gallon sizes of these pots are perfect for patios, balconies, rooftops, and decks. The company that makes the fabric pots retails them on their own site here: <http://www.smartpots.com>. Also, there is a wider [variety of different fabric pots and plastic grow bags sold on Amazon](#).



Grow Bags from Gardeners Supply: This company always carries the trendiest new garden containers. They offer an extensive selection of grow bags for planting potatoes, tomatoes, salad greens, and herbs (all these crops can grow in them, but none of the others outperform the way that potatoes do).

Park Seed: Retails the plastic potato grow bags as well.

Alternatively, just try running an online search for “potato grow bags” or “tomato grow bags” and you will see plenty of other buying

options.

Now that we have touched on the subject of hanging gardens, I cannot end this section without mentioning upside-down planters. A product called the Topsy Turvy Planter got this all started, and went on to a life of fame on late night TV shopping networks. In fact, you can hang a plastic bucket or a bag of soil from a strong hook or outdoor rafter and plant it with a tomato plant (or other TEP plant).

You need to cut a 2-inch diameter circle in the center of the bucket bottom. Many houses have a protruding rafter beam on the outside of their walls beneath the eaves at the edge of the rooftop. This or a strong hook can make a good hanging location if you secure the hanging planter safely. A strong tree branch could work, too, if the tree does not shade the location too much.

For a soil bag, you also need to cut a similar-sized planting hole, but you will need to reinforce this with a strong ring to prevent the bag from tearing further. The outer ring of a Mason jar lid or a PVC pipe fitting works well, secured to the bag by some duct tape. Also, take a close look at the rest of the soil bag. Many brands have small holes punched in the sides for aeration. This is not a bad thing, and you may prefer to keep these holes. But if you see any ripping, use some duct tape to cover it tightly.

When buying a soil bag, there are a few important considerations. First, either “potting soil” or “potting mix” can work; potting soil is a complete product that tends to be heavier, while potting mix is a lighter blend that contains more organic material. Either one can work for this. Keep an eye on whether the mix contains fertilizer or not, since this will affect whether you need to provide extra food for your plant.

Second, the ideal size for a soil bag to grow TEP plants would be somewhere in the range of 16 quarts to one cubic foot (holding 4.0-7.5 gallons of soil). Anything larger would be really heavy. You could suspend the bag by running a rope or a strong piece of wire through the top end of the bag (again, preventing any further rips with duct tape), and then looping this around your outside rafter beam.

With both the holey bucket and the holey bag, the procedure is to plant a large-sized seedling plant (not a small one) upright in the hole, water it in so the soil is moist, and then turn the whole thing upside

down and hang it so the plant is growing downwards. Careful, it's heavy. You will lose a little soil through the hole, but everything settles into place fairly soon. The plant and its root ball will hold the soil in place.

Yes, the upside-down plant will grow downwards and then outwards towards the sunlight. If it is hung at a reachable height, this makes harvesting easy and prevents the need for any staking or trellising. You water the plant from above, normally using a hose with an appropriate attachment. This may require putting another hole in the top of the soil bag, while the bucket lid could be removed or cut with a hole on top. If you keep the lid off, then cover the top few inches of the soil with mulch to make sure the soil does not dry out quickly from evaporation. Don't forget to add a little organic fertilizer at the top of the soil (unless your bag of soil already contains fertilizer), which you should water in well.



Finally, I want to emphasize that almost ANY kind of container should work fine for growing TEP plants. The ones I have mentioned here work very effectively, but there is nothing wrong with using a large pot or old tub. If you want to try something new, or want to take advantage of the time savings that self watering planters provide, then I hope this information on innovative containers is useful to you. But you do not need anything fancy to grow TEP plants; any old bucket, tub, or pot is just fine. Don't forget to put some mulch on top, which will cut down on your need to water as frequently.

Below is a picture of some eggplants growing in plastic drawers from a

storage container.



Chapter 5: Growing in Raised Beds and Garden Rows: Preparing Your Organic Vegetable Garden

While tomato, eggplant, and pepper plants can be raised successfully in containers, their natural place is in the ground. Both traditional garden rows and raised beds are well suited for TEP plants. As you may have guessed by now, these plants are pretty adaptable, so they can grow effectively in almost any kind of garden arrangement.

Traditional row gardening involves placing plants directly in the ground soil. The main advantage is the affordability and speed with which you can start a garden, while the downside is that plants may not grow as well in your native soil as they would in the pampered environment of a container or raised bed. The success of a traditional garden depends heavily on the quality of your garden soil. If your soil is loose, fertile, and well draining, your vegetable garden will thrive there.

If you have poor soil that is pH imbalanced or contains too much heavy clay, then you can amend it by digging in some other materials to compensate for the imbalance. Please see [Chapter 3 on Where to](#)

[Locate Your Garden](#) for more information on amending heavy soil. In general, even if you're not sure what kind of soil you have, digging in a layer of organic matter into the first 10-12 inches of the soil is rarely a bad idea. Compost, aged manure, leaves, lawn clippings, hedge trimmings, and shredded paper are a few suggestions. More organic matter will improve the structure of most soil and allow both air and water to penetrate to the roots.

If you suspect your soil is too acidic or alkaline, then get a pH test, either by buying a pH meter for a few dollars at a nursery or by getting a professional soil test from a lab recommended by your county's agricultural extension office (professional soil tests are more reliable). TEPS plants grow best in soil with an acidity range of 6.2-6.8, with 6.5 being ideal. If a test reveals your soil to be much below or above that ideal range, you can amend it. Adding organic matter will bring any soil closer to 7.0, and that's usually all you need. If a more radical fix is needed, then other supplements can send the pH higher (such as limestone) or lower (such as sulfur).

If your ground soil is too rocky, contains too many tree roots, or does not drain well (see [Chapter 3 for more information on this](#)), then consider using raised beds or containers instead. Both of these options can provide your plants with a good growing experience. Remember, happy plants make more vegetables! But assuming your soil is free of these big problems, then it is probably good enough to grow TEP plants. They need good soil, not necessarily great soil.

There is nothing more rewarding than growing a vegetable garden from the ground up. Planting your vegetables in a row from east to west is a good way to take advantage of the sun's rays all day. Most peppers, eggplants, and determinate tomatoes are small enough that the plants can be fit into clean rows and grown side by side. Be sure to allow 2-3 feet between plant centers and 3-4 feet between parallel rows. Rows can be as wide as the plants, say 1-2 feet, and as long as your garden space allows. In larger gardens, you will want to break up the length of rows every 6-8 feet to allow for pathways where you can walk. If you leave a generous space (at least 3-4 feet) between parallel rows, you should have enough space to walk, water, weed, and harvest your crop.

Your garden does not need to be linear. There is no rule preventing you from doing something more creative with the design. You are welcome to make beds that are circular, blocky, star-shaped, heart-shaped, spiral-shaped, or labyrinthian. You can do whatever suits your

available space and your aesthetic taste. As long as your plants get enough sunlight, water, and organic fertilizer, they will be happy with any design you choose.

When growing indeterminate tomato plants, you will need to give them more space than other TEP plants. When you're growing them in beds, adhere to the widest possible spacing recommendations of 3-4 feet between plants and 5-6 feet between rows. And with large tomato plants, sometimes traditional row culture is just too formal. If you have a good spot for one plant and another good spot for a second plant, feel free to plant these tomatoes where you want them. Just make sure there's not too much else nearby, because they will take over those areas.

Even within the category of indeterminate tomatoes, there seems to be a lot of variation in plant size. Some can fit nicely in a pot, while others can top a six foot fence. For example, Stupice is a delicious early season tomato variety which does not get much bigger than many determinates. Though they are classified as indeterminates, I have grown these potato-leaved beauties in containers many times. And then there are indeterminates that can barely fit in a raised bed, such as a cherry tomato like Sweet 100 or Sungold. These giants routinely reach seven feet tall in my garden by the time fall comes. And I don't even live in a very warm climate.

So unless you can find some information from your nursery or online about the ultimate size of the particular varieties you want to grow, be cautious and give them plenty of space. Growing plants too close together prevents air circulation, which encourages diseases. Plus, they are impossible to harvest when they're all growing into one another (not just tomatoes, but peppers and eggplant as well).

And now we come to my favorite method of growing vegetables: raised beds. A raised bed is created by improving the native soil (usually by digging in some compost or manure) and by mounding up the soil to create an elevated bed. It can stand anywhere from a few inches to a few feet above the surrounding land. Raised beds can have all made of wood, stones, bricks, concrete, straw bales, or other material, or it can have no side support at all around the mounded soil. Raised beds can be as long or as wide as the gardener chooses, or they can be round, oval, triangular, diamond, shamrock, or any other shape.

There are many advantages to using raised beds. The only real

disadvantages are the added cost of materials and the added work involved in digging up and amending the soil. This is why they are also called intensive beds. But if you have the time and means to create raised beds rather than traditional garden rows, they are well worth the trouble.

The first advantage is that the soil in raised beds remains looser and less compacted than ground soil. Both air and water can penetrate easily to the roots, giving the plants what it needs. The looser soil, in addition to the greater depth of fertile soil, provides plants with a luxurious growing environment. You can easily grow plants closer together in raised beds, achieving greater production, since there is so much space for their roots. Some gardeners even use the square foot technique, placing one plant every 12 inches. I think this is too tight for larger TEP plants (unless you want to prune them to one vertical vine), but smaller determinate tomatoes and miniature peppers should be able to handle 12 inch spacing in raised beds.

Another advantage with raised beds is that the soil warms more quickly. In large raised beds, the temperature also stays more moderate than the surrounding area. Warmer and more consistent soil temperatures contribute to faster growth and happier plants. This is especially true early in the year when the weather is still cooler than they like.

But the biggest set of advantages with raised beds is their convenience for the gardener. You do not need to bend over very far to tend to the plants, water them, weed them, and harvest them. You can even construct a seat above the wall on a raised bed, so no bending is needed at all. Anyone with back problems or knee problems, any elderly gardeners, or even gardeners in wheelchairs can maintain a garden with raised beds of an appropriate height.

They are easy to cover, also. Need a season extender? Cover your raised bed with plastic greenhouse film, stretched over some PVC pipe or a bent wire frame. Birds eating your seedlings in the springtime? Stretch some plastic bird netting over the beds. Need some shade protection in the heat of summer? Put a shade cloth over the top. Gopher, mole, or noxious weed problems? Line the bottom with poultry wire or a weed barrier, and staple it in before filling the bed with soil. How about a trellis? Pop it right in; you won't need to whack it in with a mallet. How to water? Drip irrigation systems or soaker hoses can be attached to the sides to keep them in place. I could go on and on!

There's one more neat thing I must mention: you can put raised beds atop almost any surface. A raised bed is like a container with no bottom (though you can add a base or a sheet of plastic liner if you need to protect a surface underneath). Patios, walkways, rooftops that can handle the weight, rocky ground that's too hard for digging: these are just a few places where raised beds can go. And of course, you can put them on top of a lawn also, without even digging it up. A green lawn with a few raised beds on it looks beautiful, especially once those beds are overflowing with veggies and flowers.

The raised bed in the picture below was built from salvaged wood. The hoops are made from PVC pipe, which is cheap and easy to find at a hardware or home improvement store, and they serve as a frame for any possible netting, greenhouse film, or shade cloth.



You can make your own raised beds from a kit or from scratch. There are some good kits online, but they tend to be very expensive. If you can obtain some materials locally at a reasonable price, then you can keep the cost down. You may be able to get some salvaged wood, cinderblocks, bricks, or galvanized metal sheeting when someone in your area rebuilds a fence or remodels a house.

In most locations, if you have to buy new material, wood is usually the cheapest option. Plywood may not be strong enough or durable enough. Paying a bit extra for rot-resistant cedar or redwood will give you a raised bed that last for many, many years. Other kinds of wood can be treated to make them more durable, but be wary of chemicals in pressure treated wood. You may be able to find an environmentally friendly alternative. Also, many decks these days are built from composite lumber, which is durable recycled plastic. It's often more expensive than wood and its long timbers tend to bow in the middle without extra support, but if I could find a good deal on it locally, I would love to make some composite raised beds.

To make a raised bed, you simply clear and flatten the area over which you want to build it. If you are covering a patio or other hard surface, then laying down a piece or two of plastic sheeting (the kind they sell in hardware stores) can help create a barrier. Next, mark off the area you wish to build on with some string or chalk. I like to measure the sides so they're even, then pound in a temporary stake at each corner and wind some string around the outside of each. If I like the layout, then I will get started making it.

Most of my raised beds are four feet by eight feet (4' x 8'), though I have some as small as two feet by four feet (2' x 4'). Any smaller than that and it might be a better use of your time to go with containers. As far as height, I like tall beds with deep soil for plants. Some people build raised beds with just a few inches of height, while others build them as high as 24-36 inches off the ground. The choice is yours, and while deeper beds give you more growing space, they require more materials which increases their cost.

For a simple wooden raised bed, you will need four corner posts. Some people use two additional posts to attach to the center of the planks on each long side. This is important to do only if you use lightweight siding material or if your sides are six feet or longer. Corner posts can be made from four by four (4" x 4") lumber, which I recommend for large beds or for beds built on hard surfaces. For smaller beds, you can use two by two (2" x 2") stakes. Siding can be attached on the insides or the outsides of the stakes.

You will also need some lumber for siding, and it saves you cutting time if you build your bed to a regular size for which you can get pre-cut lumber (for example, 2" x 10" lumber cut to six feet in length). Also, you will need nails or screws; I prefer screws because they hold the wood more tightly over time. Get more nails or screws than you

think you will need.

First, put in the corner posts. If there is soil underneath the bed area, cut posts that are a foot or so taller than the bed you're building, cut one end into a point, and use a mallet to knock the post in until it is secure and reaches your desired height. If there is a hard surface underneath, just cut the corner posts to the desired height of your bed, or slightly taller if you want them to stick up above the walls.

Next, attach the siding timber on the length and width of your bed, using the nails or screws. This will be more difficult on the hard surface, because the corner pieces do not stay in place unless you use concrete. For these, you might as well just lay the two posts you are using flat on their sides and place the siding on top of them to attach it, moving the walls into place as you need them. Once you have attached all the siding material, then you are finished with the raised bed frame. Feel free to line the bottom with poultry wire and staple it in if you fear any gophers, moles, or burrowing pests. Some people put in a plastic water barrier, which does not allow for good drainage, but does save a lot of water over time.

Whether you make a raised bed from wood or another material, you will need to fill it. This becomes another expense, unless you can get some free material. A four foot by eight foot (4' x 8') raised bed that's 12 inches tall will hold 32 cubic feet, or slightly than one cubic yard, of material. And that's just to fill it up initially, because your bed will continue to need more material as the soil settles and biological activity continues to break it down. After a few months, the soil level will drop and you will need to top it off again.

Your filler does not need to be soil. In fact, I recommend using plenty of organic matter, such as compost, leaves, straw, aged manure, kitchen scraps, coffee grounds, hedge clippings, and the like. All of this will break down just fine. It will make wonderful soil in six months or a year, though you can plant in it right away and your plants will not mind growing in this unfinished compost or mulch. If you have sufficient quantities of both "brown" carbon rich material (dry leaves, newsprint, straw) and "green" nitrogen rich ingredients (coffee grounds, kitchen scraps, grass clippings, manure), then you can alternate them in different layers (also known as "lasagna gardening"). You probably will not have enough to fill the whole raised bed, but you can get started with these materials and cover them with some soil or compost.

In the picture below, you can see the beginnings of some layered compost at the bottom of a new raised bed.



When you need more volume, you can fill a raised bed with almost any combination of soil and compost as well as other ingredients like peat, sand, and low grade manure. The most cost effective mix that works well in raised beds is about 25% sand or perlite, 25-50% compost, and 25-50% peat moss. If you buy bag after bag of potting soil to fill larger beds, the cost will add up quickly, but this works fine for smaller beds. To fill a big void, it is more cost effective to order a delivery of planting mix or compost, supplementing this with whatever organic matter you can scrounge together yourself.

Raised beds sit above the ground, so they drain well, but this means they need lots of watering. If you fill your bed with uncomposted organic matter, then you will need to keep it moist to encourage this material to break down. The process of decomposition will grind to a halt if you allow it to dry out. Whether you plant in it right away (which works fine) or wait for this material to break down, covering the top surface with a thick layer (two to six inches) of mulch can help seal in the moisture and provide a warming blanket for the soil.

I have a number of raised beds in my garden. I always leave one, or at least half of a raised bed, for the chickens. This bed is taken out of

circulation for a time so that our backyard chickens can have at it. Using a portable dog fence, I attach this bed to their free range chicken run, so that they have free access but stay out of the veggies. The chickens peck up the bugs, till the soil, fertilize and aerate it, and then I move them to a new bed. A few months later, I can plant again in the chicken bed, which has revitalized soil.

Chickens are great in the garden, eating our kitchen scraps and providing plenty of fertilizer for the plants. If you would like to learn more about how to raise chickens for eggs in an urban backyard, please take a look at my short [book on this subject, entitled *Backyard Chickens for Beginners*](#). Chickens are much easier to care for than many pets and they give you fresh, organic eggs every day. Here is a picture of my chickens using half of a raised bed, which has [a permanent blueberry planting at one end](#) and also is growing some broccoli and potatoes.

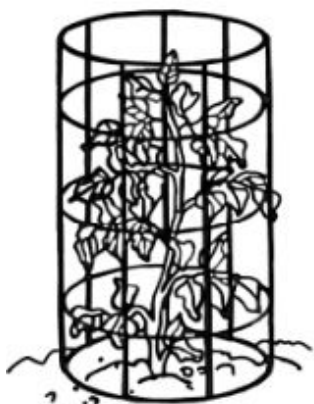


Chapter 6: Supporting Your Tomato Plants: Stakes, Cages, or Trellises?

Most pepper, eggplant, and determinate tomato plants are relatively small, ranging from 1-4 feet in height. They have strong stems and are capable of supporting themselves in the garden. But once they set

fruit, things begin to change. Within a matter of weeks, each branch becomes weighted down by the fruit, and this forces the branches downwards.

Left to their own ways, these branches can bend downwards until they block your garden pathways, break under the weight of their fruit, or even reach the ground. These plants will be happy to bear their crop along the ground, but unfortunately much of it tends to rot and get eaten by insects and grubs there, while wet leaves pick up diseases.



Wire cage used for support



Staking with a single stake

This is why we need to support TEP plants with some staking, trellising, caging, or other mainstay, keeping the branches off the ground where fruit can ripen and be picked. Without being tied to stakes, the branches and tomatoes in the picture below would be all over the ground.



And then there are the indeterminate tomato plants. Determinate varieties of tomatoes stop growing at about 3-4 feet in height, but indeterminate varieties will keep on growing until they are killed by frost. Some of them grow to 6, 8, or even 10 feet tall. When you purchase tomato seeds or seedlings, the word “determinate” or “indeterminate” should be written on the seed packet or the label on the nursery pot. If you plant an indeterminate tomato, you will need to provide some serious structural support.

Here are the most common methods of supporting plants in the TEP family. Among home tomato growers, there is a fierce debate about whether to stake or to cage tomatoes. Many gardeners swear that stakes are best, while others believe cages are the only way to go. Still other people use various trellises and alternative supports.

Stakes

Stakes are a simple and affordable means of support. Many gardeners use grow TEP plants with stakes which they tie to the plants using cord, wire, orchard tape, or twine. Any strong stake will do, whether it is made from bamboo, wood, metal, or fiberglass. Even copper pipe or steel rebar will do the trick. If you can find an old stick or branch that's long enough, put it to work. The stakes you use should be strong enough to hold up your plants, so aim for a similar height. Remember that they will be 6-12 inches shorter after you pound them into the soil.

If possible, place stakes in the garden before you plant your tomatoes, peppers, and eggplants. This prevents any possible damage to roots. Pound in a stake about four inches away from where you will put a plant. If you are growing indeterminate tomato plants, then feel free to use 2-4 stakes placed around the plant. Once the plant is in the ground and grows a few branches, you can begin to secure it to the stake.

To secure a plant to a stake, you can use any kind of cord, twine, wire, ribbon, bungee cords, or whatever you have available. I usually use the same orchard tape (that stretchy green stuff) or foam-covered wire that I use for fruit trees. Your local nursery should have something similar. Any garden twine will be effective also.

Basically, you want to tie the plant and its branches so that they do not fall down. Keep in mind, though, that your plant will continue to grow, so do not tie the branches tightly. When tying a main stem, allow an extra inch for stem growth. When tying branches, there are at least two different possibilities.

The first idea is to tie a loose loop around the base of the branches, gathering them inward and forcing them upward. Keep it fairly loose, because bunching together too many branches can make it impossible for them to get enough light and air. Properly done, this kind of tying creates a form rather like a bouquet of flowers. As the branches grow

longer and begin to spill out again, you can tie another loose loop a bit higher up to gather them a little closer together again.

This picture shows a loose gathering loop on a bell pepper plant, which appears to be made from a strip of cloth or cloth tape.



Another option, which you might have to do later anyway, is to tie up individual branches. As the plant grows, particularly with larger peppers and indeterminate tomatoes, you will start to see a big branch or two that starts to extend out horizontally or downwards. Lasso that stray pony with your rope, gradually pull it back in so the branch doesn't break, and then tie it in a more upright position that is closer to the main plant. Make sure this branch does not overlap with other

parts of the plant; it should still have its own space to grow, even if this is closer and more upright than before.

You can use multiple stakes for the same purposes, tying branches in their vicinity. Alternatively, if you have 3-4 stakes, you can tie your cord around the outside of them and make something resembling a cage. Here is a picture of a tomato teepee cage, which was made from three stakes that are pointed together at the top and secured with ribbon. Also notice that the bed (perhaps the only part of the garden that is tended!) is nicely mulched with straw.



Cages

Tomato cages are big sellers at nurseries around planting time. Some gardeners swear by them, while others prefer stakes. These are wire cages made in a cone or rectangular shape. They come in different sizes, ranging from a tiny cone that's three feet tall (including the end you have to stick into the soil) to heavy-duty, professional grade cages that stand 5-7 feet above the soil.

I think the small ones are a waste of money. While they will work alright for small tomatoes, peppers, and eggplant, they tend to be flimsy and their welds break after a season or two. If you are growing small plants only, then just tie each one to a stake or two and save a few bucks on the cages.

If you are growing larger plants, particularly indeterminate tomatoes, then cages make a lot more sense. Those big plants get extremely heavy, and their branches will fall down and break, if you do not give them some support. You will use an awful lot of stakes and cord to tie them up, which also takes time. In my garden, I would rather have a nicely built cage which is in place when I plant my larger TEP plants. Here is a picture of one at planting time.



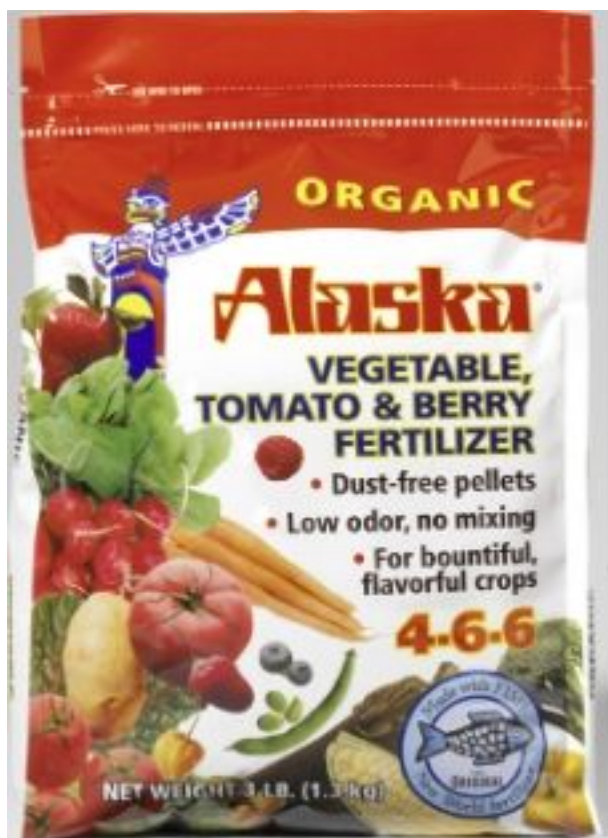
Other Trellises and Supports

Of course, you are not limited to takes and cages for TEP plants, though most gardeners probably use one or the other. Some people make their own 3D tomato “cages” by building a structure out of wooden stakes or PVC pipes. When built, these more closely resemble 3d ladders than cages, but they have a similar function of letting the plant grow up through the middle and supporting its branches. You can use any other standard plant trellis (as in the picture below). Or you can tie a plant to a fence or other existing structure, such as the railing on a balcony.



Chapter 7: Feeding Your Plants

When you plant your TEPs, or within their first couple of weeks, you need to add some plant food to the soil. If you have prepared the soil by digging in good compost or manure, then it already contains low levels of the nutrients needed to sustain plants. Most plants will need a little more fertilizer than this, but it will not need as much if your soil has been amended. Like other plants, TEPs require plenty of Nitrogen (N), Phosphorus or Phosphate (P), and Potassium or Potash (K). Plant fertilizers list these three numbers on their labels. Fertilizers come in a bag or box and look something like this one:



Organic tomato fertilizer showing N-P-K

Proper Fertilizer

At the time of planting or soon after, you can add some organic fertilizer to the soil near the plants, scratching and watering it in to the top few inches. To find some good fertilizer, go to your local nursery and find their organic fertilizer product line (most stores seem to sell at least one organic brand these days). Either the “tomato”, “vegetable”, or “all purpose garden” fertilizer should do just fine. A

3-5 pound box or bag will last a long time.

Before you buy fertilizer, check the “N-P-K” ratio listed on the box or bag (in the previous picture, you can see the “4-6-6” numbers on the bag). An ideal N-P-K ratio for tomatoes is around 5-5-5, give or take. Make sure there is some phosphorus (P, second number) and potassium (K, third number), because if those numbers are as low as “0” or “1”, then your plant will not have the nutritional support to produce very many vegetables. Also, make sure the nitrogen (N, first number) is not much higher than “5”. If the nitrogen ratio is something like “8” or “12”, then your TEP plants will grow some incredible green foliage, but they will not produce many tomatoes, eggplants, and peppers.

Follow the application instructions on the back label of the bag or box. Add a scoop or two of the fertilizer to the soil near your TEP plants (but a few inches from the stem) and scratch it in to the first few inches of soil. Cover it with a little soil or mulch. And then water the soil well, so that the fertilizer starts to dissolve and flow down towards the plant roots.

One soil amendment that many gardeners frequently use with TEP plants is bone meal or fish bone meal. This has a small amount of nitrogen, plus lots of phosphorus and calcium. Fish bone meal includes trace minerals also. If you mix a spoonful or two of bone meal (or fish bone meal) into the soil before planting your TEPs, it should improve their root growth. And this will put enough phosphorus in the soil that you won’t need as much regular fertilizer. You can add a small amount of potash from a small quantity of fireplace ashes, greensand, or kelp meal. And then you can try cutting down on the organic fertilizer by half, since TEP plants do not need as much nitrogen as most fertilizers supply.

Chapter 8: Watering Your Tomatoes, Peppers, and Eggplants

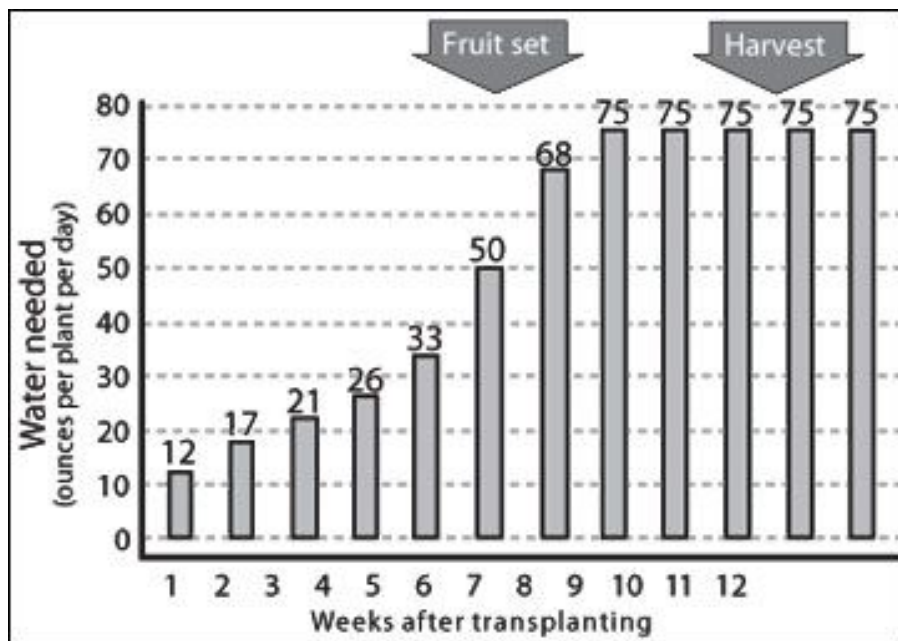
People often ask me if it is best to water plants early or late in the day. The best answer is: water early. Unless you are in the middle of a summer heat wave in an extremely hot climate, then watering in the late afternoon or evening is one of the worst things you can do. The best time to water subtropical plants is in the morning (and more specifically, late morning).

There are two big reasons to water in the morning. First, plants grow

faster in warm temperatures. Water cools them down and slows their growth, but plants watered in the morning have time to warm up again in the sun. Second, wet leaves are a recipe for plant diseases. Leaving them wet in the evening means they will be wet all night, whereas the sun can dry out leaves that were splashed in the morning.

Once TEP plants are transplanted into the garden (or into a large growing container), their watering needs will increase along with their growth. Every two weeks, your plants will be almost doubling their water needs. When fruit begins to set on the tomato, eggplant, and pepper plants, you need to water them even more. Measured by weight, the average tomato is about 94% water!

Your plants' watering needs will vary depending on your heat, humidity, soil drainage, whether you mulch your plants, and what type of watering system you employ. Below is one estimate of the watering requirements for tomato plants from seedling to harvest stage. This seems pretty accurate from my experience, though I only water once or twice a week instead of daily. Small peppers, eggplants, and tomatoes can get by with less than this.



One estimate for watering needs

The Secret Life of Plants

TEP plants grow best when soil and air temperatures are warm. They

use enzymes to grow and these perform best between 68-77 degrees (F). Unfortunately, tap water tends to be much colder than this, usually in the 40-60 degree range. Water also has a cooling effect on the surrounding air as it evaporates. Therefore, watering plants in the morning gives them time to warm up with the heat of the day, whereas a late afternoon bath will cause them to stay at cooler temperatures for a much longer period.

But this isn't the full story. To understand the whole picture, you need to know two key facts about the secret life of plants:

Key Fact #1: For every temperature increase of 10 degrees (F), plant growth roughly doubles. This is true for tomatoes up to 77 degrees Fahrenheit (25 degrees Celsius), which is the highest optimum temperature for plant growth. Below 77 degrees, growth rates are slower (they would be half as fast at 67 degrees, and half that fast at 57 degrees, etc.).

Key Fact #2: Plants do most of their growing *at night*. They are much more efficient at building their tissue when the sun is down and lights are off. Scientists do not fully understand why this is true, but most plant growth occurs after dark. Therefore, you want the plants to be warm at that point, so that they'll grow a lot.

Put together the #1 and #2 facts. They should help you reach one simple conclusion: watering late in the day is a dumb idea. Even in the Southern United States in the heat of summer, the average low temperatures in most areas stay below 77 degrees. I reviewed the historical average temperatures for 16 American cities (New York, Los Angeles, Sacramento, Denver, Phoenix, Omaha, Chicago, Dallas, Houston, New Orleans, Orlando, Atlanta, Charlotte, Memphis, Washington, and St. Louis). Of those, only Dallas had historical average low temperatures of 77 degrees or higher for more than a few days in July and August.

TEP plants are subtropical. Unless you are trying to cool them off in a heat wave, then watering late in the day will hurt their growth. Just when a plant is storing up the day's warmth and getting ready for its nighttime growth spurt, you rain on its parade with a cold water bath. What you are really doing is ensuring it will take longer to harvest your ripe tomatoes, peppers, and eggplants!

However, if you water plants in the morning, you will leave plenty of time for the sun to warm the air and soil around the plant.

Specifically, the best time of the day to water your plants is late morning, because this will ensure that they spend the least amount of time in the cooler temperatures induced by watering. The soil will warm up most quickly from a late morning watering.

And then you will not have to wait as long to get beautiful heirloom tomatoes like these.



One trick is to warm the water first. Some gardeners do this before watering their beloved tomato plants. But heat requires extra energy (which doesn't come cheap these days), so warming the water only pays off if you are using passive solar water heating. Here are three examples of passive solar water heating which can work well:

Example #1: Black Barrel. Store some water in a black tank or rain barrel, which can be warmed by the sun. Use this water to irrigate your garden. If you are growing on a smaller scale, with perhaps one or two plants in containers, a dark-colored bucket or watering can might warm up if left in the hot sun.

Example #2: Soaker Hose. Soaker hoses are made from black rubber and they have small holes on the sides so they can water evenly throughout a garden bed. Unlike drip irrigation lines and their frustrating emitters, soaker hoses do not get clogged with dirt and soil particles. This allows you to bury them in the ground under an inch or

two of soil or mulch. Water delivered underground will warm up more quickly. Very little water will evaporate to cool the surrounding air.

Example #3: Build a Passive Solar H2O Heater. Black PVC pipes are cheap and they absorb plenty of heat from the sun. So do metal pipes (preferably painted black) if you can get some cheaply. Use them to build a little network of pipes that your water supply must run through before reaching the garden. For example, with a few short lengths of pipe, elbow connectors, and T-connectors, you can create a square or rectangle with some crossbars in one direction (sort of like a window frame with jail bars in one direction). This has a lot of surface area to pick up solar heat and transfer it to the water inside.

Another alternative is to “dry farm” your tomatoes by watering them very little or not at all. Dry farmed tomatoes are extremely sweet and tasty, but you will not get as many of them and they may not grow as large. You can try this if you are growing tomatoes directly in a ground based row or raised bed, and if you have a fair amount of underground water (such as a high water table or regular rain throughout the growing season). Plants will grow deeper roots to get to the water and though they will not produce as much fruit, it will be very flavorful due to the higher ratio of nutrients.

Dry farming, of course, will not work for container grown plants or those grown in a raised bed with a barrier (like plastic sheeting or gravel) below. Also, in arid areas that do not receive summer rain, like most of the Western United States, dry farming may be pretty difficult. Soil in these climates gets parched without irrigation. A variation, which I practice, is to stop watering near the end of the season. You certainly do not need your plants to grow more vegetation at that point. As the water is reduced at that time of year, their natural clock will be telling them to ripen as many fruits as possible. Cutting the watering before the end of the harvest helps ensure that the last tomatoes you pick will be the sweetest and most fully flavored of all.

Preventing Plant Diseases from Spreading

Another reason not to water in the morning is that plant diseases spread easily when leaves get wet. If you water in the morning, drops of water on the leaves should dry off in the sunshine. But watering late in the day usually leaves moisture on the foliage that can remain there all night. Wet leaves provide the perfect environment for transmission of fungal diseases like early blight, late blight, and Septoria leaf spot.

Keeping your plants' leaves dry will cut the risk greatly. It also helps to stake, cage, or trellis your TEP plants, so that the branches do not come into contact with the wet ground. And providing plenty of space between plants and between branches (pruning some of the more aggressive tomato plants if you must) promotes aeration, which also will help reduce leaf diseases.



Don't let this happen to your tomatoes!

Go Easy On Yourself and Automate the Watering

Some gardeners love to water every day. The simple task of watering plants provides an important daily connection to the garden and gives us the opportunity to check how everything is growing. For other gardeners, especially those of us with day jobs and families, regular watering can be a real pain in the rear end.

Why not install some automatic watering? This can be as difficult as digging up the yard and installing a whole network of sprinkler like pipes. Or it can be as simple as buying a sprinkler or soaker hose for each of your garden rows, raised beds, or groups of containers.

Drip irrigation systems are a source of endless frustration. If you have

a very small garden, such as a few containers, then you can buy one of the readymade drip system kits that should be large enough to tend a few plants. If you have a huge yard, then drip irrigation may make the best sense also, but I do not envy you for the time and trouble it will take to install and monitor all those hoses and emitters.

For most lazy (or busy) gardeners, I suggest going with either a sprinkler or a soaker hose. Sprinklers get the job done, but they are not very precise. If you have any wind at all, you will waste more water. And sprinkler get the plant foliage all wet, which is better to avoid.

Nevertheless, sprinklers are easy and they are familiar to many backyard gardeners. If you do not mind wasting some water, then sprinklers provide a reliable way to water your plants. Also, don't forget to water in the late morning so that wet leaves will dry off in the sun.

Soaker hoses have lots of good points and fewer problems, though they are not perfect either. These hoses are made from rubber with many small holes on the sides, so that the water is released in fairly uniform amounts all the way down the line. Also, soakers come in the same width as standard garden hoses, so they can be screwed right onto a faucet or hose fitting, whereas drip lines are smaller and need to be fitted.

There are three more positive attributes worth mentioning. First, soakers are very easy to install: just drape them where you want them, screw them in, and turn on the water. Second, soakers put the water where plants need it: into the ground. You can even bury them under the first inch or two of soil, delivering the water right to your plants' roots. Soakers do not get clogged like drip emitters do. Third, soaker hoses (like drip systems) do not get plant leaves wet (especially if they are buried in the soil or mulch), which is a major downside with sprinklers and even with manual watering.

But soaker hoses have one big drawback. Uniform watering throughout the row is great for closely spaced crops like lettuce or peas. But for TEP plants, which should be spaced at least a couple of feet apart, it would be better to have more water delivered right near the plants and less in between them. Nevertheless, this is a small tradeoff, since the plants' roots will find the water as they grow.

If you are raising TEPs in containers on a patio, balcony, rooftop, or

deck, then soaker hoses make no sense at all. Most of the water will fall outside the containers and you will waste a lot. For container-grown plants, you'll have more luck with small drip kits, sprinklers set for a low water pressure (with a limited coverage area), or plain old manual watering with a hose or watering can.

Sprinklers, soaker hoses, and drip irrigation systems can be attached to an automatic timer. The electronic timers operate on batteries, turning on the water to your plants for a certain period of time with a set interval (for example, every morning for 30 minutes or twice per week, etc.). These timers cost around \$25-\$30 in nurseries and hardware stores. Alternatively, you can get one of the cheaper manual "egg" timers, which you activate by cranking the dial. They will turn themselves off after whatever time you set. You need to be there to turn them on, but not to turn them off.

One of these options may save you time, while allowing you to provide regular watering to your plants. We are all human and we have busy schedules, but forgetting to water can cause a lot of stress for plants. Automating the watering helps them to stay watered, keep growing, and remain on track to produce you a great harvest.



Chapter 9: Three Tips for Pampering Your Plants: Happy Plants Produce Lots of Fruit

Top #1: Give Your Plants a Protective Blanket: Mulch, Mulch, and More Mulch!

The simplest step you can take to help your TEP plants succeed is to mulch them generously. Mulch is any material that you apply on top of the soil. It can be plant matter (such as straw, leaves, shredded paper, coconut coir, or wood chips). Or it can be plastic, like the red mulch sheeting sold in nurseries which supposedly boosts tomato plant production. Lawn clippings, hedge trimmings, old cardboard boxes, stones, coffee grounds, and compost are all examples of mulches.

A blanket of mulch, applied 3-6 inches thick around the base of the plant, will provide its roots with a protective layer. The results on your TEP plant's production will be amazing. If you want to test this for yourself, choose two plants of the same variety, mulching one and leaving the other to fend for itself in the soil. See which one grows taller and healthier, exhibiting less stress from severely hot or cold weather, and produces bigger, sweeter tomatoes even without being watered as often as its exposed neighbor. When you see the results, you will never again grow vegetables or fruit trees without mulching them heavily.

Here is a picture of some tomatoes and peppers growing in a well-mulched garden.



Any mulch is better than no mulch. But some mulches are better than others. In particular, I recommend using a mulch made from organic plant matter that can break down into the soil. Plastic sheets, rocks, and large wood chips need to be removed eventually, while cocoa bean shells, straw, coffee grounds, hedge trimmings, untreated sawdust, rice husks, and seaweed all nourish the soil and slowly feed the plants as they decompose.

Of course, you can try some of that red plastic mulch if you prefer. Black, silver, green, and other shades are sold also. Red mulch is supposed to improve tomato production by reflecting the right wavelengths back to the plant. If you buy some plastic mulch, make sure to pick up some ground staples also. It is possible to weigh down the sides and corners of a plastic sheet with bricks or stones. However, research has shown that plastic mulch works best when it is in close contact with the soil, and not when there are gaps present between the sheet and soil.

Why mulch? There are many good reasons. Here are some of the biggest benefits of growing your plants under a protective blanket:

1. **Reduces Water Use.** Mulch keeps the soil moist underneath. It cuts down on evaporation, often reducing watering needs by 50-75%. Typical soil does not absorb very much water and the top of the soil

loses water to evaporation. But a mulch of organic matter such as compost, leaves, or grass clippings absorbs more water and seals it into the soil.

2. Increases Root Growth. Studies have shown that plant roots grow better under mulch than without it. Mulch also encourages more soil life below it, so beneficial earthworms and other organisms are stimulated. Earthworms really enrich the soil and help plants grow bigger; encouraging them to flourish is the best way to maintain plant vigor and disease resistance. And mulching with organic matter will bring the earthworms.

3. Moderates Soil Temperature. The soil beneath the mulch stays a more constant temperature. Severely hot or cold weather can stress plants, which reduces their growth and productivity. Mulched plants have almost none of this stress, since the temperature is much less volatile underneath this blanket.

4. Reduces or Eliminates Weeds. Weeds have a hard time getting through 3-6 inches of mulch or some plastic sheeting. There are some that will, but you will cut down on your weeding time greatly if you use lots of mulch. This is true in all parts of a garden and orchard, not merely your tomato bed or container.

5. Minimizes Water Runoff, Erosion, and Splash Back. Watering problems are greatly reduced with mulch. They absorb a lot of water which otherwise would run off from the surface of typical soil. On a larger scale, they prevent erosion. On a smaller scale, a plant is less likely to get its leaves wet from a hose when the water lands on mulch, so this can help reduce the risk of spreading plant diseases.

6. More Attractive. A heap of rotting seaweed you dragged from a beach might not qualify, but some mulches look nice on the soil and honestly help beautify a garden. Cocoa bean shells are dark brown and smell like a chocolate factory for the first few days. Coconut coir fiber is an attractive reddish brown that holds its color better than redwood. And straw or alfalfa definitely gives your little garden the country farm look. If you want the country odor, too, then throw on some cow manure.

7. Nourish the Soil. Some mulches decompose fairly quickly (though 3-6 inches will get you through the TEP plants' growing season). As they begin to decompose, they also serve as a low level fertilizer, which can boost TEP plant growth.

Tip #2: Treats for Sweet and Flavorful Tomatoes, Peppers, and Eggplants

Okay, now that you put some plant food in the soil, you can relax. Just keep watering them and wait for the tomatoes to come in. Most likely, you will get lots of tomatoes, peppers, and eggplants pretty soon and they will taste better than anything sold in stores. But wait, is there a way to get even larger and sweeter tomatoes, peppers, and eggplants? I'm glad you asked.

TEP plants are a lot like people or pets. They enjoy a good meal and they also love their treats. By giving them some good garden fertilizer, you have provided for their basic nutrition. Now if you throw in a few extra treats, they will show you some real love.

What else do they like to eat? Here are five things they just love: compost, kelp meal, worm castings, rabbit manure, and alfalfa. You can apply these to the soil as solids by mixing them with your mulch. But because TEP plants grow quickly, it is even better to give them immediate access to the beneficial nutrients and compounds found in these foods. There is only one way to do this.

Make them some tea. You shouldn't drink this kind, but your plants will. Yes, I know what you're thinking: there's no way I'm making rabbit **** tea! That's fine, since you can use any of these ingredients. The project requires use of a five gallon bucket, strainer, and either a second bucket, large watering can, or garden sprayer. A five gallon bucket is the standard size used for paint or bulk foods, but make sure you wash it out well before re-purposing one for TEP tea.

Fill the bucket with water, adding one of these ingredients, and covering the bucket loosely with the lid or a piece of wood. Rainwater works best, but you can use tap water also. If you have only chlorinated tap water, fill up the bucket and then let it sit for an hour or two with the top off before adding anything else. This will allow the chlorine to dissipate; it can kill too many beneficial microbes which are the key to this tea recipe.

Once you have added both the water and tea ingredients (yes, you can use more than one ingredient if you want), cover it loosely and let it brew. Make sure the bucket is in a position to warm up in the sun, but not too much that it will get hot. After 2-3 days, your tea will be ready. Opening it up, you should notice a slightly fermented smell like

beer or vinegar. That means the tea is ready.

Here is a rundown on the possible ingredients. Below these descriptions, we will discuss how to apply the tea to your tomato plants.

1. **Compost.** Compost is the ultimate organic matter. It is made up of the remains of decomposed plants. There is a big difference between high quality compost (from kitchen waste, manure, or herbicide-free lawn clippings) and that woody stuff they sell at the big box garden centers. Composted kitchen scraps can have an N-P-K value as high as 2.0-1.3-2.2, though most compost is probably lower in nutrients than this. Woody material, on the other hand, like the shredded bark based “compost” sold by big national brands, is not fit for anything but pathway mulch. It can even suck up nitrogen from the soil as it decomposes. If you do not believe me, then look at the next picture, and notice the yellow leaves on the two scrawny plants growing in wood-based compost: they’re even sorer looking than the control plant!



Rich compost or manure beats that woody mulch sold as “compost”

If you make your own compost at home, then just take a scoop of this wonderful stuff and put it in the water bucket. If you do not brew your own at home, then try to find some good compost at a local nursery or landscaping supply store. It should be dark, crumbly and slightly moist material with an earthy aroma. If the stuff they sell looks more like bark fines or tiny shredded wood chips, then head out the door and find a better nursery.

You can use composted manure, also. Manure from some pastured animals like cows, horses, or sheep is fine because it is pretty low strength. It usually has a lot of composted straw or bedding in it. Stick with composted or aged manure, not the fresh stuff, as fresh manure contains ammonia and possibly pathogens. Composting or aging it will ensure the ammonia is converted to nitrogen the plants can use, while pathogens will no longer be present after either hot composting or sufficient aging.

You need to be very careful if you use poultry manure (chicken, turkey, or other) to make plant tea, since it is so potent with nitrogen. In general, I would avoid using poultry manure tea for tomato plants, but a spoonful of aged poultry manure in a bucket would not be too much and it would increase the microbiological activity by a good deal (again, only use manure that has aged for at least a few months). If you cannot find any good compost or composted manure, then move on to one of these other possible ingredients.

2. **Rabbit Manure:** This stuff is special because, unlike other manures, it does not need to be composted before use. Rabbit manure is so gentle on plants that you can put it right in the garden, no aging or composting needed. Also, this manure has more nitrogen than many pastured animal manures. Put a cupful in a bucket of water, let it sit, and give them a good drench with this stuff. Your plants will love it.

3. **Alfalfa:** You can use alfalfa meal (sold as a soil amendment at nurseries), alfalfa pellets (pet stores and some nurseries), or alfalfa straw (pet stores and farm supply stores). In any form, this stuff is magic in the garden. Alfalfa is a nutritious green food with lots of protein. It also contains a substance called triacontanol, which is a natural hormone that stimulates plant growth. Use as much of the straw as you can submerge in a bucket of water. The meal and pellets are pretty concentrated, so a handful per bucket should do the trick. If you do not have access to alfalfa, clover is a close relative which also has great nutrition and a high protein content. It also is pretty common in many backyards.

When you fertilize with rabbit manure, your plants get plenty of alfalfa, too. Even the dry rabbit food pellets are full of it.



4. **Kelp Meal (or Kelp Extract):** Kelp, *Ascophyllum nodosum*, is a seaweed that grows in cool, temperate ocean waters. While you can harvest it yourself on a beach, the kelp meal and kelp extract sold for gardening are much more concentrated. In dry form or as a diluted liquid fertilizer, it makes a great addition to any garden. Kelp is a source of phosphorus (K), is packed with essential trace minerals that plants need, and contains natural growth stimulants (much like alfalfa). It comes in a powdered form known as kelp meal and a liquid concentrate that can be mixed in water. Some powdered forms are water soluble also. [Here is an example for sale online.](#)

5. **Worm Castings:** When earthworms or composting worms eat soil and organic matter, it goes through their bodies. What comes out is known as worm castings. It still looks a lot like soil or compost. It certainly does not smell like manure. Yet it contains more plant nutrients than soil does, and it is teeming with beneficial

microorganisms. You can buy worm castings at any nursery. Add a cup of them to your bucket of water for a great tea.

6. Weed or Leaf Tea: I know I said five possible ingredients, but here is one more that also works. Do you have some large-leaved weeds growing in your yard? Dandelion greens, dock, and wild radish are common examples in my area. Each of these has nutritious leaves. Pick a handful or two of these to put in your water bucket. They will brew a fertilizer tea which contains small amounts of all major nutrients that tomato plants need. For that matter, lawn clippings (from yards not treated with herbicides) work well also.

Why It Works

These teas contain small amounts of important nutrients for plants. But the main reason they work is because they are very biologically active. They are teeming with soil-based organisms that are very beneficial to your plants and garden soil. Compost tea has often been touted as a “cure all” for garden diseases. Such claims may be dubious, but these teas probably will help nourish your plants and improve their resistance to diseases. Like eating yogurt, having a healthy balance of the good guys in your system means there is less chance of the bad guys developing a big enough population to cause trouble. I read somewhere that eating good yogurt reduces your body’s risk of developing upper respiratory infections (including from colds) by more than 40 percent. Compost tea probably keeps plants healthier to a similar degree, since some of the good bacteria even attack and eat the fungi or insect larvae that might bother your plants.

Here is one secret that few people understand: plants are meat-eaters. They prefer to derive the majority of their nutrients from the bodies of soil organisms. Rich soil, nourished by the addition of organic matter and whole food organic fertilizers, contains a healthy balance of organisms. Just one teaspoon (one gram) of healthy garden soil contains as much as one billion bacteria, several yards of fungal filaments, thousands of protozoa, as well as nematodes and earthworms.

Non organic fertilizers, on the other hand, contain chemically synthesized ingredients. Most of them just include a few of the main minerals, but not a full range of the whole foods that nourish plants and soil. Plants love chemical fertilizer at the beginning, because they can take up the nutrients very easily. But over time, using these will result in imbalanced soil with a broken web of life. And this will result

in more plant diseases and pest attacks, since the garden's natural sources of immunity will be gone. Much of commercial agriculture is stuck in this rut right now, which is why they use so many pesticides.

There are two ways to apply the tea: as a foliar spray on the leaves or as a soil drench in the ground. To spray the leaves, you will need a garden sprayer such as people use to spray pesticides (though on a smaller scale of a few plants, a hand spray bottle could be used). Sprayers and spray bottles are available at nurseries and hardware stores, as well as on Amazon.



Foliar sprays can be used only on non-edible parts of the plant. So with tomatoes, you should use them before the flowering and fruiting stages, just to be sure there is no risk of contaminating the fruit with something that makes you sick. This is extremely unlikely, as studies have shown that most soil based organisms are healthy additions to our digestive systems (they already live on the vegetables we eat, and people pay big money in health food stores for the supplements containing them). Nevertheless, compost tea or other fertilizer teas should not be used on the parts of plants we eat.

I only use foliar sprays on fruiting plants in the springtime before flowering. After that, I give them compost or fertilizer tea as a soil drench. Basically, this just means watering their soil with the tea, so

you can take out a few cupfuls per plant or else just dump parts of the bucket's contents next to each plant you want to treat.

If the tea in the bucket is relatively clear, you can just use it "as is". But if there is a lot of junk floating around in it, then you can strain the tea into your second bucket, large watering can, or sprayer. I usually skip the watering can. I only strain the tea if I am using a sprayer (which clogs easily), but for soil drenches, I will dump both the liquid and any remaining solids from the bucket right onto the soil.

Happy plants grow great tomatoes, peppers, and eggplants. Give your plants a compost or fertilizer tea at least once this summer (a soil drench is easiest) and they will thank you. You will boost the health of your soil and plants. And those summer vegetables will never taste sweeter.

Tip #3: Don't Forget the Calcium and pH

Calcium is not a macro nutrient (like the N-P-K's listed on fertilizer labels), but TEP plants certainly need it in their soil. Calcium deficient tomatoes, peppers, and eggplants can get a condition called blossom end rot, which starts with the younger leaves curling and dying, and then goes on to produce fruits with a big dark rotten spot on them. At a lesser level of deficiency, they just do not form as well or taste as good.

This tragedy is very much avoidable if you provide plenty of calcium. Not all fertilizers include calcium, and not all soils have enough of it.

Lime (calcium oxide) is a commonly used soil amendment that comes from limestone. If you can find dolomite lime, this supplies some magnesium also. By adding lime to the soil, you can fix a calcium deficiency *and* raise the pH level of soils that are too acidic. To lower the pH of alkaline soils, you can apply some soil sulfur. Both lime and sulfur are organic soil amendments that are sold at nurseries. Follow the directions on the lime or sulfur package very closely and do not over apply, since you can kill your soil with too much of either one.

Other possible sources of calcium include eggshells, bone meal, fish bone meal, and oyster shells. Many of us have eggshells in our home that are destined for the compost or garbage. Instead, wash them out with water as well as possible, then crush them into small pieces and

mix them into the top few inches of the soil around your tomato plants. Eggshells not only add calcium to the soil, but they are too sharp for some crawling slugs, worms and insects. Scattering them at the base of your plants is not a bad idea if it can provide some pest control.

Crushed oyster shells, available at feed stores and farm supply stores because they are fed to chickens, can be used like eggshells. They supply both the calcium and the sharp deterrent to crawling pests. As maritime ingredients, both oyster shells and fish bone meal supply some trace minerals to the soil as well. If you use another source of calcium and are worried about a lack of trace minerals, then try a little kelp meal also.



Crushed oyster shell is a great source of calcium for tomatoes

Bone meal and fish bone meal add calcium as well as a bit of nitrogen and a ton of phosphorus. Both are organically approved byproducts of meat production and they are available at nurseries. If you have planted already, then either bone meal or fish bone meal can be added just like the eggshells, sprinkled around the base of the plant, scratched into the top few inches of soil, and watered in.

There are some gardeners who never use fertilizers on their TEP plants, and their tomatoes, peppers, or eggplants are just delicious. They simply amend their soil with rich compost or manure, put a scoop of bone meal into the planting hole and mix it into the soil before planting their tomatoes. If you decide to try this at home next

year, then combining the bone meal with a little kelp meal would ensure plenty of potassium and trace minerals. If you are lacking the rich compost or manure, you could add some nitrogen from a small amount of alfalfa meal, cottonseed meal, or feather meal.

Conclusion

In conclusion, treat your TEP plants well and they will produce lots of ripe, sweet, juicy fruit for you. They love plenty of water (at the right time of day), good nutrition, and treats. I hope this short book has provided you with some good information on growing these terrific plants and assuring their ultimate happiness. If you love eating tomatoes, peppers, and eggplants, then their happiness is your happiness. Have a great harvest this year!



Yes! That's what we like to see!

Appendix A: Homegrown Tomato Sauce Recipe (enough for 1-2 pounds of pasta)

I admit to being one of those cooks who cannot cook the same dish twice. The second time and third time, I am adding new things and

experimenting with the proportions. Good recipes are extremely useful for people who are faithful to them. For the rest of us, we still benefit from seeing the proportions of the main ingredients listed. This Homegrown Tomato Sauce recipe is a great place to start.

Don't be limited by the ingredients listed: feel free to be creative. Add whatever vegetables and herbs you have in season. If you want to throw in some fresh thyme, a cubed homegrown zucchini squash, extra garlic, or any other favorite or seasonal ingredient, feel free to make it your own! This sauce may be canned or frozen for later use. Please be aware that some tomatoes are more watery than others, so you may need to adjust the proportions to suit your tastes. Roma type tomatoes are pastier and better for sauce, but for this recipe I am substituting your average homegrown slicer tomato.

Ingredients

Group 1:

- 6 large tomatoes, chopped
- 1 large onion, chopped
- 1 sweet bell pepper, chopped
- 1 small eggplant, cut into small cubes
- 1 medium carrot, grated
- 15 mushrooms, sliced or chopped
- 6-8 cloves garlic, minced (as much as you like)
- 1 bay leaf (can use 2 for a deeper flavor)
- ½ cup extra virgin olive oil

Group 2:

- 2 handfuls of fresh basil, chopped (or 1 tbsp dried)
- 2 tablespoons fresh oregano, chopped (or 1 tbsp dried)
- 1 cup red wine
- Sea salt and fresh ground pepper, to taste
- Optional: a pinch of celery seed, chopped fresh chili pepper, or chili pepper seed

Directions

Wash and chop the vegetables. Put the olive oil in a pan and start sautéing the onions, garlic, and mushrooms on medium heat. When onions are translucent, add the tomatoes and all other Group 1 ingredients. Cook for a few minutes, stirring as needed. Then add the Group 2 ingredients. If you plan to eat the sauce fresh, then reserve half of the chopped basil for later use, but add it all now if you are canning or freezing the sauce.

Continue cooking on medium heat until ingredients are incorporated, about 10 minutes. If sauce is watery, keep cooking it until it reaches the desired thickness, which maybe another 10 minutes or so. For fresh sauce: As you turn off the heat, add the last half of the chopped basil and stir it in well. Serve sauce over pasta (this is enough sauce for 1-2 pounds) and fresh grated parmesan cheese. Garnish with fresh basil or parsley leaves.

Appendix B: How to Dry and Store Tomatoes, Peppers, and Eggplants

There are several different ways to dry tomatoes and peppers. The three main methods are listed below. For tomatoes, Roma type tomatoes work best, since they are denser and have less liquid than other kinds. But you can dry any tomato from beefsteak to cherry. With peppers, larger kinds like bell peppers should be cut into strips, while chili peppers can be dried whole or cut in half. Eggplants have a different texture of flesh than their relatives and they really need to be dried in a dehydrator (or sun-dried in a very warm climate) for best results. Once dried, TEP veggies can be stored for months and added to soups, sauces, casseroles, pastas, beans, or rice dishes.

Preparation: Roma and smaller types of tomatoes and peppers should be cut in half for drying, cut sides up. Larger tomatoes and bell peppers can be quartered and dried, cut sides up. Remove the seeds from the cut peppers. If your tomatoes are wet, squeeze out some of the water and seeds over the sink or a bowl. If you want, you can rub the sides with olive oil, chopped herbs, and/or sea salt, which is an optional step. Some people even boil or roast the peppers first and blister off the outer skin, which reduces bitterness but takes more time.

Sun Dried Tomatoes and Peppers: Choose a place outside that gets full sun exposure all day. It should be off the ground, such as on top of a table, boxes, or other furniture. You may have bug issues, so higher is better. You can place tomatoes on baking sheets, plastic wrap, waxed paper, really clean window screens, cutting boards, or anything else you have that seems appropriate. During the first day, they will lose a lot of moisture, but this is only the beginning of a long process. Keep taking them inside at night (unless you can protect them from nighttime critters) and putting them back out again in the morning. Keep this up until they are nice and dry. It may take as long as 20 days.

Oven Dried Tomatoes and Peppers: Place cut tomatoes or peppers on a cooking sheet and bake them at the lowest temperature or anywhere from 150-250 degrees. This can take many hours, so you may need to turn off the oven at night (leaving the tomatoes there if they are still wet) and resume again the next day. Again, keep it up until they are fully dry. It may take most of a day, but it is much quicker than drying them in the sun.

Dehydrated Tomatoes and Peppers: If you have a food dehydrator, you can put your cut tomatoes in the racks and turn on your machine. Follow the manufacturer's directions in your instruction manual or just keep it going until they are dry. Drying fresh food at 100 F degrees preserves more nutrition and enzymes, but it is much quicker to dry them at a hotter temperature.

Dehydrated Eggplant: Working with eggplant is a little trickier because of the inside texture. The best thing to do is cut your eggplant into thin strips or small cubes and toss them into some boiling water to blanch them for 30 seconds or so. Then immediately remove them using a colander or slotted spoon, and cool them with cold water to stop the cooking process. If possible, squeeze out a little of the water without turning the eggplant into paste. Then pop it on a dehydrator rack and turn on the machine until the eggplant pieces are dry.

Chili Pepper Ristras (Dried Peppers on a Braid or String): If you like the picture below, then you may want to try making your own chili pepper ristras. This involves securing dried chili peppers to a string or dowel, and braiding them if you so choose. Usually, they are made with fresh chili peppers, which are then hung on the ristra to dry. Here is a great guide from New Mexico State University on how to make ristras, which illustrates the process step-by-step: http://aces.nmsu.edu/pubs/_circulars/Circ533.html.

Storing and Using Dried TEP Vegetables: Once they are really dry, you can store these vegetables in locking zipper bags or airtight containers on the shelf for months. Alternatively, you can freeze them for even longer in a freezer container. To use dried tomatoes, peppers, and eggplants in soups and stews, just pop them into your pot and cook. To rehydrate them for use in pasta, casseroles, beans, and rice dishes, first soak them in water, broth, or wine for about an hour. Boiling water speeds up the process but removes some of the flavor.



Appendix C: 12 Delicious and Unusual Varieties of TEPs and Where to Get Some Seeds!

Finally, this book would not be complete without introducing you to a few amazing kinds of tomatoes, peppers, and eggplants you may never have seen. If you recognize one or more of these varieties, you might be excited to see them here. But I'm guessing that even the most seasoned TEP gardeners and gourmands will find something new here. These varieties are not only unusual; they are some of the best-tasting vegetable selections as well.

For me, this is all about sharing the broad diversity of different vegetables and encouraging others to grow some of the rare, heirloom varieties (and high quality new ones) which are important to preserve and enjoy. For each one, I also mention which of the seed companies were selling them the last time I checked. (The names of these seed sources appear in parentheses after each description, and they refer to

the companies listed in Chapter 2.) Happy growing and happy eating!

1. **Pineapple Tomato.** This is one of the best tasting heirlooms. It's a huge, orange beefsteak tomato, ideal for slicing, and it has the fullest tomato flavor you are likely to find anywhere. There are green and pink variations on this one as well. (Park Seed, Territorial)



2. **Tam Jalapeno.** This is a mild jalapeno variety developed at Texas A & M University. Pick them when they're still green and you should get a pepper that looks and tastes like a jalapeno, but is mild enough to eat on the spot, raw or cooked. Even kids will eat them! (Baker Creek, Johnny's)



3. **Japanese Black Trifele Tomato.** In looks and taste, this is a very unique, pear-shaped tomato. Probably from Russia rather than Japan, it is dark red splashed with dark purple/black and green shoulders. The taste is distinctive with a smoky chocolate aroma. (Southern Exposure, New Mowing, Johnny's)



4. **Rosa Bianca Eggplant.** This is an Italian heirloom which is purple and white with some ribbing on the sides. Quite simply, it is the mildest variety and most peoples' favorite once they taste it. Very few seeds in the flesh. (Southern Exposure, Johnny's, High Mowing)



5. **Jimmy Nardello's Sweet Pepper.** It looks hot, but tastes sweet with a great flavor for fresh eating, frying, or any kind of cooking. This is a very popular Mediterranean heirloom. Many home gardeners who try growing Nardello's declare it to be their favorite sweet pepper. (Territorial, Baker Creek, Southern Exposure)



6. **Amish Paste Tomato.** As the name suggests, this one is fabulous for making sauce. An important heirloom Roma-type tomato that came from an Amish community in Wisconsin. (Southern Exposure, Baker Creek)



7. **Rosita Eggplant.** This heirloom from Puerto Rico produces bright purple fruits with sweet, mild flesh. It is one of the prettiest eggplants and quite tasty. (Southern Exposure, Baker Creek)



8. **Costoluto Genovese Tomato.** Full-flavored, sweet, and acidic, this heirloom has the strongest taste of any tomato. It is ideal for sauce, canning, and juicing, and it's pretty good for fresh eating and cooking, also. Bright red with distinctive lobed pattern. (Park Seed, Territorial)



9. **Peter Pepper.** These Cajun chilies resemble another word beginning with pe---, the male sexual organ. Be forewarned: the picture below carries at least an “R” rating. Of course, they’re on the spicy side, about 10 times hotter than your typical jalapeno. (Pepper Joe’s)



10. **Ping Tung Long Eggplant.** This is an heirloom variety from Taiwan. It has a great texture, less bitterness than others, soaks up sauce more evenly than American/Italian types, and cooks perfectly on the grill. (Baker Creek, High Mowing, Southern Exposure)



11. **Fish Pepper.** This heirloom from the mid-Atlantic region gained popularity in African American communities for cooking

with fish and seafood dishes. The spicy peppers impart a nice flavor and the plant offers a unique, two-toned appearance with both green and white leaves. (Baker Creek, Southern Exposure)



12. **Ground Cherry (Husk Tomato, Pineapple Ground Cherry).** A related species, these husked fruits resemble small tomatillos. When peeled, they look more like cherry tomatoes, and can be enjoyed raw or made into jam. There are several varieties out there. The golden kinds have a very sweet-tart, fruity flavor, while the green ones are tarter and more acidic. These are short, spreading plants, which do not need staking. My kids enjoy opening them and love the taste. (Territorial, Southern Exposure)



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How to Grow Beans and Peas: Planting and Growing Organic Green Beans, Sugar Snap Peas, and Heirloom Dry Beans and Peas

By R.J. Ruppenthal, Attorney/Professor/Garden Writer

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12. Harvesting Dry Beans and Saving Your Own Seeds

Never Buy Bean Seeds Again!

Conclusion: Additional Resources on Heirloom Beans

Heirlooms Taste Better and Provide a Link to Our Past

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“What most moved him was a certain meal on beans.” –Robert Browning, *The Bean-Feast*

Chapter 1: Introduction

Beans, peas, and other edible legumes are important foods for people all around the world, providing an affordable, abundant, and nutritionally dense source of protein. Dry beans and peas can be stored for many months past the harvest and cooked into a delicious and filling main dish, earning them the nickname “vegetarian meat”. Green Beans, Snow Peas, and Sugar Snap Peas, the immature pods of the bean and pea plants, can be eaten raw or cooked as tasty and nutritious green vegetables.

However you like to eat beans and peas, they are very simple to grow in an organic garden. This short book will walk you through the process of growing beans and peas. You will learn the differences

between pole beans and bush beans, how to choose the right bean varieties for your climate and region, and how to obtain the freshest organic bean and pea seeds. You will learn how to plant beans and care for the plants, including proper soil and fertilization, watering, and trellising of pole beans. Finally, we will discuss how to harvest your beans and store them properly.

Domesticated beans originated from wild ancestors in the legume family. Since ancient times, humans in different parts of the world have cultivated common beans (such as Kidney Beans, navy or haricot beans, and Pinto Beans) and many of their leguminous relatives. Other popular varieties include Broad Beans (favas), Peas, Lentils, Chickpeas (garbanzo or ceci beans), Lima Beans, Butter Beans, Tepary Beans, Cowpeas (including Black-Eyed Peas), Pigeon Peas, Black Gram (Urad Beans), Soybeans, Mung Beans, and Azuki Beans.

You can save a lot of money over time by growing some of your own beans and peas, especially because you do not need to buy new seeds every year. Most beans and peas are Open Pollinated (OP), meaning that they are stabilized, non-hybrid seeds. In other words, you can save the seeds from one year to the next, and plant them again. Many varieties are classified as heirlooms as well, having been developed by our ancestors and having stood the test of time. Some of our modern beans and peas have truly ancient origins.

Note: For the rest of this book, I will use the word “beans” to refer to both “beans and peas”. It is a little quicker to write and easier for you to read. If you are a fan of peas, do not worry: there is a full chapter (Chapter 9) on these important legumes and vegetables. The word “peas” is used as needed in other parts of the book also. But the general term “beans and peas” will appear simply as “beans.”

Chapter 2: The Ancient Roots of Beans

Beans were an important food source for ancient civilizations, including those in Mesopotamia, Egypt, the Indus River Valley, and the Americas. The beans we know today stem from wild ancestors, which were selected and developed for favorable traits. Beans are mentioned in texts of the ancient world and the Middle Ages, including the Bible. The most famous such passage comes from Ezekial 4:9 in the Old Testament: “Take thou also unto thee wheat, and barley, and beans, and lentils, and millet, and spelt, and put them in one vessel, and make thee bread thereof.”

In each part of the world, increasingly agrarian civilizations developed bean varieties that were well suited to growing in their regions. The Incas knew and used more than 50 varieties of beans, which were a

staple of indigenous cultures throughout Mesoamerica. Cowpeas, a family of beans that include Black-Eyed Peas, probably were domesticated for the first time in West Africa. In China, Mongolia, Korea, and Japan, farmers began growing native beans well before the advent of written records. Beans native to East Asia include Soybeans, Mung Beans, and Azuki Beans, all of them thousands of years old.

Lentils, Chickpeas, and Fava Beans have been found in the tombs of ancient Egypt, attesting to their longstanding importance in the Mediterranean region. In the democracies of Greece and Rome, white and Black Beans were used to cast votes in elections. In fact, legumes were so revered in Rome that four prominent families took their names from beans: Fabius (Fava), Lentulus (Lentil), Piso (Pea) and Cicero (Chickpea).

Until European explorers reached the New World, people in Europe relied on dried peas, Chickpeas, Lentils, and Fava Beans. Peas and Fava Beans are particularly well suited for growing in cool climates such as those in the British Isles and Northern Europe, while Lentils and Chickpeas thrive in the warmer Mediterranean regions. Upon reaching the Caribbean islands, Christopher Columbus witnessed the cultivation of common beans, which had been domesticated in the Andean region. Spanish conquistadors also found the Aztecs using beans as their primary source of protein. Beans were so important that families paid their taxes to the Aztec state in beans and chia seeds.

In the centuries that followed New World colonization, common beans became popular in Europe, the American colonies, and around the world. We still use many of these varieties today, such as Kidney Beans, Pinto Beans, Black Beans, Red Beans, and Navy Beans. The latter kind got its name after the small white bean became a military staple in the 19 and 20 centuries. From Cranberry Beans to Mayacoba Beans, Jacob's Cattle Beans, Lazy Wife Greasy Beans, Hutterite Soup Beans, Stortino di Trento Beans, and Lina Sisco's Bird Egg Beans, there are many other fascinating heirloom varieties which are not widely known but have continued to be planted in certain regions.

Today, common beans and the other varieties of legumes are the major source of protein for billions of people worldwide. Tofu, Tempeh, Miso, Hummus, Falafels, Daal Soup, Baked Beans, Red Beans and Rice, Succotash, Bean Sprout Salad, Split Pea Soup, Black Bean Soup, and Green Bean Casserole are just a few foods made with legumes. More than 23 million tons of edible beans are grown and consumed in the world each year.

Beans continue to be celebrated at events around the globe. The Setsubun Bean-Throwing Festival of Japan is a traditional holiday when beans are used to drive away evil spirits. At the Arpajon Bean

Festival in France, French country chefs celebrate the highly regarded flageolet bean, a kidney bean that is harvested at an immature green stage. The Peasenhall Pea Festival in Suffolk, England highlights the humble pea with Pea Shooting, Pea Podding, and Pea Eating Competitions. The Tel Aviv Hummus Festival in Israel showcases the delicious dip or paste made from Chickpeas. And each year, the town of Mountain View, Arkansas, U.S.A. celebrates its Bean Fest and Championship Outhouse Race, reminding us that beans supply not only protein but plenty of fiber!

Chapter 3: Nutrition and Health Benefits of Beans and Peas

Dry, Cooked Beans and Peas

Dry, cooked beans are high in both protein and fiber, which is why you feel full after eating a bowl of beans. Just one cup of cooked Black Beans contains 30% of your body's daily protein requirement. A cup of cooked Kidney Beans provides more than 45% of your recommended daily allowance of fiber. Compare this with a meat-based protein alternative such as a beef steak, which also packs plenty of protein, but with lots of saturated fat and 0% dietary fiber.

In addition, most beans contain plenty of B vitamins and minerals. Lentils are some of the most nutritious beans. One cup of cooked Lentils contains between one tenth and one third of your body's daily requirements for thiamine, niacin, vitamin B6, folate, and pantothenic acid. The same cup of Lentils also provides high doses of key minerals, including manganese (49% of recommended daily allowance), iron (37%), magnesium (18%), phosphorus (36%), potassium (21%), zinc (17%), and copper (25%), but no sodium (less than 1%).

Beans, being more affordable than meat, have long been a staple of peasant diets around the world. As societies become more affluent and turn towards meat as a primary protein source, beans become more associated with a lower class diet. This happened in ancient Greece and Rome, where beans were considered peasant food, and it has happened again in our modern high culture with its readily available supplies of red meat, poultry, and fish for protein.

As people have turned away from traditional diets and towards more meat, refined grains, and processed foods, advanced countries have experienced great increases in the rates of obesity, cancer, heart disease, diabetes, and other chronic ailments. Nearly every diet program out there suggests reducing empty calories and fat while eating more beans. Beans nourish you and fill you up, leaving you with less of a craving for fattening, high-carb foods.

Green Beans (Snap Beans)

Packed with vitamins, minerals, protein and fiber, green beans are considered a super vegetable. You can eat them raw or cooked. One cup of green beans, which is about 15-20 pods depending on their size, provides the following percentages of your body's recommended daily needs of these vitamins: vitamin C (30%), vitamin A (15%), vitamin K (20%), vitamin E (2%) and B vitamins (single digit percentages of several).

In addition, you will get between 4% and 12% of your daily requirements of key minerals such as calcium, iron, magnesium, potassium, phosphorus, copper, and manganese. Not long ago, green beans were also called string beans, and while the stringiest fibers have been bred out of modern varieties, a one cup serving still provides 3.7 grams of dietary fiber (15% of your daily needs). And as a bonus, the same quantity of green beans supplies two grams of protein (4% of your daily needs).



Green beans also contain important quantities of omega-3 fatty acids and antioxidants, making them a great addition to any healthy diet. The rich green color in green bean pods masks their high levels of carotenoid pigments such as beta carotene, but green beans have as much or more carotenoids, lutein, and flavonoids as some foods that are deep orange or yellow in color. There has been some research linking green beans with benefits to the cardiovascular system as well as decreased inflammation. Green beans appear to be quite anti-inflammatory.

Sprouted Beans and Bean Sprouts

By sprouting dry beans, you can soften the hard seeds, improve their nutrition, reduce the necessary cooking time, and make them more digestible. Some sprouted beans can be eaten raw, while others become edible with a few minutes of cooking. Sprouted beans have higher levels of protein and less starch than dry beans. The body can assimilate their nutrients more efficiently, while the reduction in starch makes it easier for many people to digest sprouted beans.

The simplest reliable method of sprouting beans and peas is by using a jar with a perforated lid. Alternatively, you can buy a sprouting lid or cover the jar with cheesecloth or a screen, held in place by a rubber band. This holey lid is important to allow for air flow and to allow you to rinse and drain the sprouts easily, which helps prevent mold.

Put 1-2 tablespoons of dry beans in your jar and cover them with water. Let them soak overnight. The next morning, pour out the water through the porous lid, and place the jar either vertically or horizontally on a tabletop, shaking it lightly so no seeds are stuck to the top. At least twice each day, cover the seeds with water again, pour this out, shake lightly, and put the jar back in its place. After a few days, you'll have some sprouts!

For a more in-depth overview of how to sprout grains, beans, nuts, and vegetable seeds for raw food sprouts and microgreens, please see my short book entitled [How to Sprout Raw Food](#). It is available on Amazon in both e-booklet and print editions.

Chapter 4: Green Beans (Snap Beans), Shelling Beans, and Dry Beans

Green Beans (Snap Beans): When the pods are picked as a vegetable before the beans inside are mature, they are called green beans or snap beans. These can be picked anytime between pod formation and bean maturity, though green beans are tastiest when young and tender. This category covers not only bean pods that are green in color, but also yellow wax beans, purple-podded beans, and those with stripes or mottling on the pods. The flat Romano beans, rounded French Filet beans, and fuzzy Scarlet Runner Beans are other examples of bean pods that can be picked and enjoyed as a nutritious green vegetable. Here is a picture of some multicolored snap beans (unfortunately, the purple pods lose their color and turn green when cooked).



Shelling Beans: These are a fresh variation on dry beans. Shelling beans are harvested once the pods and beans are mature but before the beans have dried out. You can cook them right away, as you would cook dry beans, but they need much less time to cook. Shelling beans cannot be stored for any length of time, because their high moisture content will cause them to rot. Here is a picture of some beautiful, purple-and-white, shell beans.



Dry Beans: When the pods and beans are left on the plants to dry out completely, you will end up with dry beans. These are the type of bean we are most accustomed to cooking. Dry bean seeds can be stored for long periods because their moisture content is so low. Save a handful or two for next year and plant them again for another crop! Below is a picture of some various dry beans. From left to right, top to bottom, they are black turtle beans, Kidney Beans, Adzuki Beans, Pinto Beans, navy (haricot) beans, brown Lentils, Mung Beans, and yellow split peas.



Chapter 5: Pole Beans versus Bush Beans

For most of human history, farmers have grown their beans on tall, climbing vines. These plants, known as pole beans, frequently extend 6-10 feet tall and need some support from a trellis, wall, tree trunk, corn stalk, or stake (hence the term ‘pole beans’). There are many varieties of pole beans, including those developed to be picked early at the green bean stage and others best suited for a late season harvest as shelling beans or dry beans.

Pole beans are incredibly productive. One pole bean plant might produce 2-3 pounds of green beans, versus probably half a pound per bush bean plant. Half a dozen pole bean plants may produce more green beans than you can eat in a summer. This is okay, of course, since green beans can keep for many months when frozen or pickled. If you let the beans stay on the plants and mature, these same plants

will leave you with plenty of high protein beans, either at the fresh shelling stage or the dry bean stage.

If you enjoy eating fresh green beans, then pole beans have another important virtue: a rolling harvest. The plants do not produce green beans all at once, but in succession throughout the growing season. A handful here, a handful there, and pretty soon you'll pick enough green beans to make a couple of meals each week. This rolling harvest will continue from mid-summer until the cooler autumn weather arrives.

For commercial agriculture, the rolling harvest of pole beans became a liability. On a large scale, it is far easier to harvest something that ripens all at once. For this purpose, bush beans were developed to provide large-scale farmers with a predictable crop of green beans that can be harvested mechanically.

Bush beans grow on dwarf vines that top out at about two feet tall. Plants are freestanding, so they do not need to be staked or trellised for support. They produce much less per square foot than pole beans, but their green beans are ready for picking all at once. Leave the bush bean plants in the ground and you might get a second, smaller harvest as well.

For home gardeners, bush beans have one more advantage: they are faster than pole beans. You can get a whole crop of bush beans in about 50 days from planting, while pole beans reach only the beginning of their rolling harvest in 60-70 days. This makes bush beans a great short season crop or a gap-filler in between other harvests.

Extending Your Bean Season

Use bush beans to extend your harvest at the beginning and end of the growing season. In the springtime, you can plant a few bush beans along with pole beans. Your pole beans will be your main green bean crop. But the bush beans will mature first, allowing you to harvest green beans in the early summer before your main crop is ready. By extending your harvest with bush beans, you can put summer vegetables on the table a couple of weeks earlier.



Bush beans often produce a smaller second harvest after the first one, so leave them in the ground for a couple of weeks past the first harvest to see if extra beans materialize. Then take out your bush bean plants when their harvest is finished. It will be early enough in the year still that you can plant something else in that spot. Bean plants fix nitrogen in the soil, which is particularly good for green, leafy vegetables. Once July has arrived, it is safe to start most fall vegetables; perhaps some broccoli, kale, spinach, lettuce, or chard would be a good choice to plant after the bush beans.

In a moderate or warm climate, you can also use bush beans to fill a late season gap in the harvest calendar. First, [check your first average \(Fall\) frost date to make sure you have enough time](#), and always allow a couple of extra weeks for good measure. Then plant a crop of bush beans in July or August, early enough to be sure it will mature before frost arrives.

If your pole beans are done for the year, then this will extend your harvest. If you're still picking armloads of pole beans, then you'll have enough extra green beans to freeze or pickle. Or let some of the plants go and harvest them later for shell beans.

That's the wonderful thing about growing beans; they give you so much flexibility. Any variety that is grown for green beans (such as Blue Lake or Kentucky Wonder) also makes a great shell bean. These usually are small white or brown beans that taste just as good as any navy or pinto bean (after all, they are close relatives).

If the first fall cold snap comes early, bush beans are easier to protect than pole beans. You can provide your plants with a few extra degrees

of protection by using a row cover or some plastic greenhouse film stretched over wire hoops. Often, this type of measure will buy you an extra week or two, which can mean the difference between getting a crop and not getting one.

Chapter 6: Beans and Peas to Fit Your Climate: What's Best for Your Region

Most temperate, sub-tropical, and tropical climates are capable of growing beans, peas, or related legumes for food. Here are some suggestions for what to plant in particular types of climates. Following these lists, there is a brief definition of each type of bean or legume.

Moderate, Temperate Climates

Common Beans

Runner Beans

Chickpeas (Garbanzos)

Lentils

Fava Beans

Peas

Hot, Humid Climates

Lima Beans (Butterbeans)

Soy Beans, Azuki Beans, and Mung Beans

Yardlong Beans, Winged Beans, and Hyacinth Beans

Cowpeas (including Black-Eyed Peas)

Pigeon Peas

Common Beans

Hot, Dry Climates

Tepary Beans

Common Beans

Yardlong Beans

Pigeon Peas

Cool or Short Season Climates

Peas

Favas

Runner Beans

Common Beans

Bean Types Defined (Common Varieties of Edible Pulses or Legumes)

Azuki Beans (Adzuki Beans): Small, red bean native to East Asia. These are high in protein and fiber. They are used widely in Chinese, Japanese, and Korean cooking. In all three countries, the beans are often mashed and sweetened for use in desserts, such as sweet rice cakes and bread rolls. Like soy and Mung Beans, azukis grow best in warm and humid conditions.

Common Beans: These are the beans that most of us know and love. Most dry beans and green (snap) beans consumed in North America and Europe fall into this category. Kidney Beans, Black Beans, Navy Beans, and Pinto Beans are a few examples. Green beans, yellow wax beans, and French filet beans are the immature pods of various common beans. Common beans will grow in most climates during the warm summer months.

Cowpeas: Native to Africa, Cowpeas are widely used in the southern United States. Black-Eyed Peas, Crowder Peas, and Southern Peas all fall into this category or are used as synonyms for Cowpeas. These beans thrive in hot, humid growing conditions. If you live in a cooler climate and want to grow Cowpeas, try a shorter-season variety called California Black-Eyed Peas. The picture below shows a salad made with cooked Black-Eyed Peas.



Fava Beans (Broad Beans): Favas are a great cool season crop that can be started earlier in the spring than other beans. In many climates, you also can get a fall crop from a late summer sowing. Favas are a popular cover crop in the cooler seasons as well, providing livestock

forage, fixing nitrogen, and increasing the organic matter content wherever they are grown. Slightly less than one percent of the human population has an allergy to the proteins in Fava Beans, so if you notice any trouble eating them, please stop doing so. For everyone else, these are a good off-season option for bean protein. I like to boil, skin, and puree favas to make a hummus-type dip; try adding some olive oil, a little pressed garlic, and sea salt...yummy!

Lima Beans (Butterbeans): Limas are subtropical beans that grow well in hot weather. They are quite popular in Central America and the Southern United States. While they will grow in other regions as well (such as warmer parts of the U.S. Midwest), Lima Beans are not as adaptable as Soybeans. The pods can be picked fresh for shelling or allowed to dry so that beans can be stored.

Mung Beans: Mung Beans are best known for their sprouts, which are a staple of Chinese, Thai, and other Asian stir-fry and noodle dishes. The small green bean seeds also are edible, serving as an important protein source in India, China, and elsewhere. Mung Beans grow best in warm, humid conditions, having similar requirements to Soybeans. They require a long season of 90-100 days from planting to harvest.

Peas: Peas can provide a cool-season source of vegetables and seed protein. In most climates, you can grow peas in the springtime and often get a second crop in the fall. Wild peas are native to the Eastern Mediterranean, and archaeological evidence indicates they probably were domesticated in this region that includes Turkey, Syria, and Jordan. Peas are grown for their delicious young pea pods (Sugar Snap Peas, Snow Peas) or allowed to mature for shelling or dry peas. Sprouted peas and young pea shoots are enjoyable as well. Because peas are important enough in modern cuisine and can be grown in cool weather before other beans can succeed, peas merit a whole chapter of this book to themselves.

Pigeon Peas: These legumes are popular in India, other parts of South Asia, and East Africa. They have a smaller following in the southern United States as well. The cooked beans have a slightly sweet, mealy taste and make good soups. They can grow well in hot, humid weather, but also are fairly drought-resistant.

Runner Beans: There is nothing as beautiful as an ugly fence covered with Scarlet Runner Bean foliage and its cardinal red flowers. Like peas and favas, Runner Beans can be planted slightly earlier than common beans (though they are not quite as hardy as peas or favas). Harvested early at the green bean stage, the large pods of varieties like Scarlet Emperor are tender and delicious. Even though they're a bit fuzzy, they taste much better than they look. If you wait to harvest runners for shell beans or dry beans, get ready for a "Jack and the

Beanstalk” moment. These magic bean seeds can grow as large as small eggs and are beautifully colored in pinks and purples. They also taste really good when cooked. Here is a picture of Scarlet Runner Beans flowering.



Soybeans: Soybeans may well be the most widely grown plant on this list. The beans are grown for eating, for their oil, and as a livestock food source. On a smaller scale, many home gardeners have become interested in growing soybean varieties that produce tasty green Soybeans, called Edamame in Japan. For Edamame, the pods are picked green and steamed or boiled in salt water, then they are shelled and eaten for a delicious snack. Soybeans need warm summer weather and perform well in humid conditions.

Tepary Beans: Tepary Beans are the best choice for dry, hot, desert climates. They were grown by the Native Americans in the U.S. Southwest. The small brown, black, white, or yellow beans taste like pinto or Navy Beans when cooked. High in protein and fiber, they are the most drought resistant bean on this list.

Yardlong Beans, Winged Beans, and Hyacinth Beans: These are some tropical plants grown in Southeast Asia. These are used mainly for green beans as vegetables. All of three of their names are descriptively accurate. Yardlong Beans (a.k.a. Asparagus Beans or Noodle Beans) are in the cowpea family. They hang from plants like long ropes and taste much like other kinds of green beans. They are cut into manageable sections and often appear in Thai cuisine in the United

States. Hyacinth Beans have beautiful magenta purple pods which are ornamental in the garden; Thomas Jefferson apparently grew them at Monticello. Some varieties may be toxic, but the pods and seeds are widely consumed in many tropical countries. Dry Hyacinth Beans must be boiled for long periods to remove the toxin. Winged Beans, which form large green bean pods with raised ridges, also have edible foliage and tuberous roots that are harvested for food (you can see a picture of them in the next chapter). Below is a picture of Yardlong Beans at a market.



Chapter 7: How to Obtain Good Bean Seeds

To start out, you will need some seeds for your bean plants. There are at least three ways to obtain bean seeds: pick up some seed packets at your local nursery, order some beans seeds from an online supplier, or take your chances with some dry beans you bought in a grocery store.

All three of these methods will work fine, but online ordering provides the best selection of different varieties and the highest likelihood of getting fresh seeds. If you order in the wintertime or early spring, you probably will get beans which are packed for the upcoming growing season. Reputable seed companies generally print this date on the seed packet. Buying fresh bean seeds will help ensure that they germinate at a high rate. Once you've grown beans for a season, you can save some of your own seeds (see information on saving your own seeds [in Chapter 12](#)).

Here is a picture of a lovely heirloom variety called Hidatsa Shield Bean, which was widely planted by Native American tribes in the Missouri River Valley and which grows quite well in a corn-beans-squash Three Sisters garden. As with many rare varieties, you won't find these on seed racks in the local stores! See below for a listing of some reputable online sources of bean seeds.



There are some wonderful places to buy bean seeds online. Personally, I think the best tasting dry beans come from heirloom varieties, and luckily there are many of these from which to choose (see source listings below). In [the Conclusion section](#), I also list some additional sites that provide more information on heirloom beans. You can order beans directly from a number of these places, too. If you order a pound or two to cook and try out, then it should be simple to save a few dry beans to plant as seeds also.

For green beans, I prefer to grow the modern stringless snap beans, which taste a lot less like rope than what our ancestors ate. Some of these beans, such as Blue Lake and Contender, actually qualify as

heirlooms now because they were introduced around the middle of the 20 century. Others, like Fortex (delicious even when the pods get large) and Provider (very early snap bean), are more recent in origin. And do not neglect the flat-podded Italian beans and fuzzy Scarlet Runner Beans, which make amazingly tender green beans when picked early. Runner Beans are great for shelling and drying for later use, too.

Baker Creek Heirloom Seeds sells over 1400 varieties of heirloom seeds, including more than 30 kinds of beans. They are particularly strong on dry or shelling beans. With names like Jacob's Cattle Bush Bean, Good Mother Stallard Bean, Rattlesnake Pole Bean, and Hutterite Soup Bush Bean, you just can't go wrong. These are the beans of our ancestors, some of them strongly identified with particular regions where they have been grown for many generations. www.rareseeds.com

Stokes Seeds has a great selection of green beans in both the bush and pole categories. Since they sell to growers and to the public, anyone can buy larger quantities of seed for very little price premium. In other words, for the price of two or three retail-sized seed packets, you can buy a whole pound of bean seeds, which gives you eight or nine times as many beans. This works especially well if you can store some bean seeds reliably for next year, share some with friends, or split a larger order with someone you know. Stokes has a very limited selection of dry/shelling, soy, and Lima Beans. <http://www.stokeseeds.com>

High Mowing Organic Seeds has an all-organic selection of beans. I particularly like their selection of French filet beans and Edamame (green Soybeans). From Red Swan to Blue Coco to Silver Cloud Cannellini, they have some other great choices, too. In the pea category, they offer dependable varieties of both English shelling peas and snap peas. One variety they carry, a Snow Pea variety called "Dwarf Grey Sugar", also makes delicious pea shoots (see [Chapter 9](#) for more details). This company has built a business from selling entirely organic seeds, which I like to support whenever possible. <http://www.highmowingseeds.com>

Territorial Seed Company is a good place to go if you have a short season climate. Based in Oregon, these folks specialize in vegetable varieties that succeed in cool, maritime summers, most of which also work quite well in short-climate northern or Rocky Mountain regions. Some of their extra-early bean selections include Nickel Bean (a very early French filet bean), Jackson Wonder (a lima bean for temperate climates) and California Blackeye 46 Bean (a short season black-eyed pea). If you are a fan of Sugar Snap Peas, this place has some of the

fastest and most tender varieties! <http://www.territorialseed.com>

Park Seed is a reliable choice for Southern gardeners who need vegetables that will succeed in warm climates. Since beans are heat lovers, there is plenty here from which to choose. Though I do not live in the south or have a warm climate, I have had good success with Kwintus and their other flat Italian beans. There are very few dry beans in the Park Seed catalog, but it offers an especially deep selection of green beans. <http://parkseed.com>

Southern Exposure Seed Exchange is another great bet for anyone in warm climates. They carry a number of bean varieties that perform well in heat or are drought-resistant. If you like Lima Beans and butterbeans, which grow well in the humidity of the South and Midwest, this place has an awesome selection, while most other places just sell one or two kinds. <http://www.southernexposure.com>

Seed Savers Exchange is a nonprofit organization which saves rare heirloom seeds. You can become a member or buy from them directly. They offer several dozen varieties of green beans and cooking beans in their online catalog. <http://www.seedsavers.org>

Evergreen Seeds has hard-to-find Asian varieties of many garden vegetables. If you want to try Yardlong Beans, Hyacinth Beans, or Winged Beans, for example, this place has them all. They also have Mung Beans, Indian Cluster Beans, and more varieties of Edamame (Green Soybeans) than you will find from other retailers. Below is a picture of Winged Beans growing. <http://www.evergreenseeds.com>



Chapter 8: Planting and Growing Beans

In the spring, as the soil warms, you can plant your first bean seeds. How will you know when the time is right? First, [check this site to determine your last average \(Spring\) frost date for your location](#). For example, if you live in the area of Richmond, Virginia, this site gives you a last average frost date of April 27.

Second, just to be sure there won't be any late frosts, add a week or two to this calendar date. For our example, that would suggest a

planting date around May 4-11. Note that this is the earliest possible planting date; you could safely wait longer if you prefer. Third, check the weather forecast for your area using the Internet. Look at the extended forecast for the next 5-10 days. If the low temperatures are forecasted to remain much below 50 F degrees or if there is any cooling trend during that period, you may want to wait a little longer.

Bean seeds will sprout when the soil temperature is in the 60's, but they germinate best in the 75-85 F degree range. Even if you plant bean seeds in cooler weather, they will wait and come up when they're ready. What you want to avoid is temperature stress to the young plants, which might affect their growth and eventual productivity. Be careful of planting them when it's warm enough for them sprout, followed by a period of colder weather or much cooler nighttime temperatures.

If there's any doubt in your mind, wait an extra week or two to plant. Beans grow fast and probably will catch up anyway. One way to get earlier beans is to plant some bush beans first, and follow with your main crop of pole beans when you are sure the weather is warming. That way, if a handful of bush beans fail, it is no major loss, but if they grow well, then you will be able to harvest some beans a few weeks before the pole bean crop matures. A cold frame or a cheap season extender like a [Wall O Water](#) or [Kozy Coat](#) can insulate plants and buy you a little extra protection during cool spring weather.

For other types of legumes (aside from peas, which have their own chapter next), please follow the directions printed on your seed packet.

Bean Planting Specifications

- Days to maturity (Bush beans): 50-60 for green beans.
- Days to maturity (Pole beans): 70-80 days (green beans), 75-110 days (for shelling)
- Planting depth: 1-2 inches.
- Spacing for pole beans (rows): Space seeds 4-6 inches apart in row; rows spaced 36-42 inches apart.
- Spacing for pole beans (hills): Thin to 3-4 plants per hill; hills spaced 36 inches apart.
- Spacing for bush beans (rows): Space plants 2-4 inches apart in rows; rows spaced 24-30 inches apart.
- Minimum soil depth in containers: 6-7 inches (bush beans), 9-10 inches (pole beans)
- Temperature for seed germination: 60 F (min.), 87 F (max.), 75-85 F (ideal).
- Germination time: 7-10 days.
- Transplant seedlings at: 2-4 weeks. Better yet, just plant the seeds

directly outside.

Growing in Containers, Garden Rows, and Raised Beds

You can grow beans in just about any kind of garden arrangement, including in a companion planting system such as the Three Sisters Garden. If you are growing pole beans, it is best to decide what kind of support you will provide them (see [Chapter 10](#)) and then plant your beans accordingly. Use the planting specifications above for row gardening.

For example, if you have a fence for them to climb, then planting in a straight row along the fence makes sense. If you plan to use poles or a trellis, you can plant beans around the base. In general, pole beans are a good candidate for growing in traditional long rows or in raised beds. You can grow them in larger containers also (try putting a few pole bean plants in a container at the base of a drainpipe or railing!).

Bush beans can be planted closer together and do not need additional support. This makes them a better fit for growing in containers and in raised beds of any size. For raised bed plantings, you can squeeze the rows a little tighter than in the specifications above. The soil in raised beds tends to be looser, deeper, and of better quality than the soil in ground-based rows, so plants can get by with tighter spacing in raised beds than in traditional rows.

Wherever you plant beans, the important thing is that you allow enough space for the plants to grow upward and still allow sunlight to penetrate and allow your hands to reach the right places for harvesting beans. You can even grow bush beans indoors. I grew some bush beans on a windowsill in some plastic soda bottles with the tops cut off, harvesting a handful or two of green beans from each plant.

Of course, you can grow beans in many other kinds of containers also: wood, ceramic, terra cotta, plastic, metal, fabric, and more. Make sure you use containers with a soil depth of at least 9-10 inches for pole beans or 6-7 inches for bush beans. Remember that beans like it warm, so if you live in a cool climate, a dark-colored container will retain a little extra heat on sunny days and keep the soil just slightly warmer than its surroundings. However, if you live in a really hot climate, then a light-colored container may be preferable.

While pole beans are a big commitment in terms of planning out the area and providing some vine support, you can plant bush beans as an afterthought. Do you have some extra spaces in your flower bed? A foot or two of unused space at the end of your garden? A patch of soil next to the sidewalk in front of your house? Pop in a handful of bush beans.

With their deep green, tropical-looking foliage, these plants look like they belong in any ornamental planting. I keep an extra bag of bush bean seeds and regularly scatter them in the garden every couple of weeks during the spring and summer. Remember that they fix nitrogen in the soil, which nearby plants will use, so planting bush beans around the garden is not only a selfish thing to do; it can help your other plants as well.

Chapter 9: Planting and Growing Peas

Peas are so widely planted and eaten that they deserve their own chapter. Grown in cool weather, peas provide an important source of vegetables and protein much earlier in the year than other beans (except for favas, which can grow in cool weather also). Peas taste best in the spring, but can yield a second crop in the fall as well.

As with common beans, there are tall and short pea plants and the pods can be eaten green as vegetables or allowed to mature for their high protein seeds. Two types of peas, Sugar Snap Peas and Snow Peas, are grown for their delicious green pods. If you cannot wait for the pods, sprouted peas and pea shoots (the tops of young plants) make good eating also.

Plant peas directly in the garden soil just like beans, except that they can be planted in early spring. You can plant them as soon as the ground has thawed, since they can survive temperatures a few degrees below freezing. But peas will be happier when the soil and nighttime temperatures reach the low-to-mid 40s (F). They can grow in warmer weather, too, but begin to wilt and look unhappy as the warmth of summer kicks in. Like beans, peas have the ability to fix nitrogen in the soil, so they do not need much (if any) extra fertilizer.

Pea Planting Specifications

- Days to Maturity: 10 for shoots, 60-70 for pods and shelling peas, 90-100 for dry peas
- Planting depth: Plant seeds ½ inch-1 inch deep.
- Spacing: Space peas at least one inch apart in rows 12-18 inches apart.
- Minimum soil depth in containers: 6-7 inches.
- Temperature for Seed Germination: 40 F (min.), 80 F (ideal)
- Germination Time: 9-36 days (at longer end of the range in colder soil)
- Direct seed in the garden. Peas do not transplant well.

Pea seeds are not labeled as clearly as bean seeds. Bean seeds are

clearly designated as either “pole” or “bush” beans, but many pea seeds have no such labeling. If you are considering purchasing a particular variety, look closely at the description to see if it lists the expected plant height. It may tell you that this type of pea plant “grows tall” or “can reach six feet”, then you will need to provide a trellis or some support for the plants (please see [Chapter 10](#) for some guidance on plant supports).

Alternatively, if the seed description lists the plant as a “dwarf” or “bush” variety (or if it lists a short height), then it probably will top out at around 2-3 feet and will not need additional staking. Dwarf peas do not mind being crowded. In fact, growing them close together is important so that plants can hang onto one another. This makes it less likely that plants will tip over.

Pea vines are more delicate than pole bean plants and their gripping tendrils are smaller. They do not need to go round and round a vertical support the way pole beans do (though they are capable of this). Instead, they can climb straight upwards if needed. Plastic bird netting or poultry wire fencing, stretched tight between some poles or stakes, makes a great pea fence.

If you want to try growing peas shoots (which you can do even indoors during the winter), check the seed companies for a variety called “Dwarf Grey Sugar”. Usually it is listed as a Snow Pea, but sometimes incorrectly placed in the Sugar Snap Pea category (even though it has “Sugar” in its name, this is more of a Snow Pea). Besides growing great pea pods and being one of the only edible purple-flowered legumes, the pea shoots from Dwarf Grey Sugar taste terrific.

Grow them like microgreens in a flat of soil indoors or in a shallow container outdoors. To make a couple of low-budget homemade trays, wash out a paper milk carton and cut it in half vertically (making two long halves). Fill each carton half with two inches of soil to make perfect growing trays for pea shoots.

Scatter the seeds in one layer, as thickly as you want, on top of the soil. Water them well, give them at least some indirect light, and after 10 days of growth you can harvest them by clipping off the plant shoots about half an inch above the soil. Make sure you clip them just before eating, since pea shoots wilt quickly. Enjoy them raw in salads or cooked lightly in stir-fry dishes. Below is a picture of a dish that includes both peas and pea shoots.



My family's favorite peas are Sugar Snap Peas. I wish I could tell you how to cook them, but these delicious, stringless pods rarely make it to the kitchen. These are sweeter than candy, so even my kids eat them right off the plants! Here is a picture of some bush Sugar Snap Peas ("Sugar Sprint" variety) growing in the author's garden. In the background is some red lettuce.



For Shelling Peas (also known as English Peas), simply pick the pods once they are large enough. If you like your peas small and tender, pick them once the peas have formed but before the pod skins start to toughen. The only way to know for sure is to test a few pods. Otherwise, wait until the pea seeds are showing prominently through the pod skins, pick and shell them, and cook right away for fresh eating. As with beans, make sure to use the pods in your compost or as mulch in the garden.

Alternatively, you can wait until the pods turn brown and dry out, podding the peas at that point for dry use or storage. If you save a few dry peas, you can use them as seed stock again next year. Peas, like beans, tend to be open-pollinated with flowers containing both male and female parts. Therefore, they do not require cross-pollination and it is safe to re-seed each generation again and again.

Chapter 10: Stakes, Trellises, and Other Supports

As you can tell from their name, pole beans need some support. They climb by vining their way around vertical supports, which can be made from stakes, posts, fencing, netting, twine, vegetable trellises or cages, or even naturally-present items like corn or sunflower stalks, small tree trunks, railings, or gutter downspouts. Here are some easy and affordable ways to trellis your beans.



Stakes and Poles

When you think of a pole for climbing beans, think more of a stake than a post. Any garden stake that is about 1-2 inches thick, such as those made from bamboo, redwood, and plastic, should do very well. The stakes should extend at least five feet above the ground, and remember that some pole beans can climb as high as seven or eight feet. Since stakes need to be pounded into the ground by about one foot to provide solid anchorage, you will want to find stakes that are one foot longer than the growing height you need. For example, a six-foot stake that is pounded a foot into the ground will give you five feet of height above ground, while a seven foot stake will provide six feet above ground.

Many gardeners use reclaimed wood for stakes, such as sticks and branches they have gathered. This gives a rustic look to the garden, though pole beans will cover your supports from view. Since pole beans are so adaptable, there really are only three major mistakes you can make as far as stakes and poles.

The three mistakes to avoid are as follows. First, thick posts (like big wooden fence posts) are too thick for beans to climb. You do not want them to waste all their energy going around and around a thick post, since what they really need to do is climb upward towards the light. As mentioned above, 1-2 inches of thickness is perfect for bean stakes. Second, if you happen to try a vertical support that is completely smooth, such as a metal pole, it may be too smooth for beans to climb on. They need some roughage to cling onto, which is why even the manufactured stakes in the previous picture are made with little bumps on them. And third, pole bean plants are quite heavy as they bear their crop. Any stake that is thinner than an inch in width may not be able to support their weight.

Avoid these three mistakes and anything else should work fine. I have seen some truly crazy staking projects in peoples' gardens. As long as their stakes are tall, rough, and relatively thin yet capable of holding the plants' weight, they seem to be very effective for growing beans. You can also join together a number of stakes to make a larger structure that supports a greater number of bean plants at once.

Teepee Trellises



The picture above shows pole beans climbing a teepee of stakes, which is an easy and affordable structure to build on top of your garden bed (the fencing wire on the left will make a good trellis also, but probably for a shorter plant than beans). To make a teepee, simply take three or four stakes (in this picture, thin PVC pipe is used) and space them a foot or so apart around an imaginary square, triangle, or circle in the ground. Pointing the top of each stake toward the center of the square/triangle/circle, pound them into the ground so as to anchor them sufficiently. Then gather together the top ends, binding

them with twine, rope, or wire. Plant two or three beans around the base of each pole. As plants grow and start to send out tendrils, train these around the poles and they will vine upward. You may be tempted to place four or more plants beneath each pole, but while there is enough ground space for this, the vines will crowd each other out on the poles. Believe it or not, should get more production out of fewer plants.

Longhouse Teepee Trellises



The photo above shows a longer version of the teepee, which covers two garden rows with a trellis for climbing beans. Sticking with the Native American building theme, this one might be called a longhouse. Basically, two rows of poles are used on parallel garden rows, angled inwards towards the other row. Space poles 6-12 inches apart in the rows (with one bean plant per stake) and space rows at least 36 inches apart.

In the center above both rows, on top of the “X” intersection where the stakes meet, another stake is placed horizontally to serve as a crossbar. If your rows are longer than your horizontal stake, then simply add an additional horizontal stake each time you need to extend the crossbar. Using some wire, twine, or rope, bind these stakes together at the joints where the row stakes meet with the crossbar.

For particularly long trellises, you also may want to place some heavier stakes at regular intervals. Or anchor each end of the trellis with a post, such as a metal “T” fence post or steel rebar, lashing this to the nearby stakes. The structure will need to stand up to a very heavy

load once plants cover it and begin to bear. You can grow an almost infinite quantity of beans using these teepee longhouse trellises.

Rope Ladder



This picture shows a “rope ladder” trellis. Basically, you start with a strong frame, which can be built from any available material, such as wood, metal, or PVC pipe. The frame will consist of two vertical posts (one placed at each end of the row), plus two horizontal support bars set between these posts. The low bar can be 3-6 inches or so off the ground, while the high bar should be 5-7 feet off the ground.

Then take some twine, rope, or flexible 20-gauge wire, and string it up and down between these bars. While you could drill some fancy holes in the bars, the easier method is simply to wind the twine/rope/wire up and down around the outside of these bars. Aim for a separation of 6-12 inches between each winding, and double wrap the twine/rope/wire around the bar each time to hold it in place.

Fences and Walls

A variation on the rope ladder is to use fencing wire or strong plastic netting between the frame, which provides the vining plants with even more structure to climb upon. Chain link fences or lattice fences make good trellises, too. Of course, you can add horizontal supports to the rope ladder as well. Once you are finished stringing the vertical wire/rope/twine supports for the rope ladder trellis, wind some horizontally around the end poles so that the plants have a horizontal support every 6-12 inches.

Generally speaking, a wall or solid fence will not work well for climbing beans, since there is nothing for the plants to wind around and hold onto. However, walls (particularly south-facing walls) can reflect a lot of heat and warmth, making them a perfect location to grow heat-loving bean plants. This works especially well in cool, short-season climates where every added degree of warmth results in faster growth. Any of the vertical support structures discussed here can be placed right near a wall to provide a great growing environment for bean plants.

3D Fences and Rope Ladders

Another idea is to lean together two vertical structures in an A-frame pattern. Basically, this is the same shape as the Long House Teepee structure mentioned earlier, which can support two garden rows' worth of bean plants. Here, you can learn together two panels of chain link fence, lattice fence, or frames that are strung with plastic netting or rope ladders. Make sure you provide enough support for them, possibly through additional poles or stakes, and tie everything together wherever it intersects using twine, wire, or rope.

Vegetable Cages and Bean Towers

Many nurseries sell tomato cages, which also can work as bean trellises. However, some of these are built for determinate tomatoes and top out at 36-48 inches, which is not tall enough to support climbing beans. Look for something a bit taller; a cage in the 5-7 foot range is better. A few online sellers offer bean towers, but they are harder to find in local nurseries. [Here is a very nice selection of bean towers and trellises; these provide a very productive way to grow beans.](#)

Gutter Pipes, Railings, Fire Escapes, Corn and Sunflower Stalks, Small Trees, and More

Beans can climb almost any vertical support. The Native American Three Sisters Garden uses corn stalks as vertical support for climbing beans, while sunflowers or small tree trunks can work also. When I lived in a second-floor apartment with a balcony and railing, I had pole beans growing across railings and up gutter downspouts. Make sure not to obstruct any access through fire escapes or create an unsafe condition. Also, pay attention to any restrictions that might appear in residential leases or homeowner's association policies. But aside from those warnings, just about anything goes. Be creative and sow lots of beans! Finally, if you do not have the perfect trellis for beans, do not despair. You can always grow bush beans, which literally can be planted almost anywhere in one's yard and do not need any support to grow.

Chapter 11: Soil Secrets, Fertilization, Watering, and Care

Beans are quite adaptable. Many kinds can grow in poor soil. But plants will grow stronger and produce more beans when grown in rich, loose soil.

If your garden soil contains a lot of clay or sand, you can amend it by digging in some organic matter, such as compost, manure, leaves, lawn or hedge clippings, or straw. Mixing this into the top 6-12 inches of soil will ensure good soil structure with enough air pockets for even watering and root aeration. Putting plenty of organic matter in the soil also enables healthy water retention. As a bonus, it feeds earthworms and beneficial microorganisms that can nourish the plants' roots and improve its disease resistance. If you can afford it, get a bag or two of good compost or composted manure (use chicken or poultry manure only in smaller amounts, because it's concentrated) and work this into the soil before planting. Your plants will thank you.

Fertilizer

As far as fertilizer, beans need less than most plants. This is because they are in the legume family, and these plants have the rare ability to add nitrogen to the soil. The roots of legumes form a symbiotic relationship with friendly nitrogen-fixing bacteria in the soil. These bacteria take the nitrogen from the air and turn it into a form that plants can use. Beans grown in good soil have their own little plant-food factories beneath the soil. If you've ever pulled up a whole bean plant and seen the little white beads attached to its roots, these are the colonies of friendly nitrogen-fixing bacteria. Leave them in the soil and they will remain to nourish other plants.

Legumes such as beans not only make their own nitrogen fertilizer, but leave the soil more fertile than they found it. This is why many farmers employ a crop rotation system using legumes such as beans, peas, favas, clover, or vetch. Generally, these crop rotation systems follow the legume crop with a planting of heavy-feeding, nitrogen-hungry plants such as broccoli, spinach, or other green vegetables. While crop rotations require extra planning and care, they can create a significant cost savings by reducing the need for extra nitrogen fertilizer.

Your beans will not need much nitrogen fertilizer. Pole beans will benefit from a small quantity to fuel their leafy growth, while bush beans do not need any extra nitrogen. However, beans need adequate amounts of other nutrition, including phosphorus (phosphate) and potassium (potash). These may be present in your soil already, particularly if you have amended it with good compost or manure. If not, add a small amount of organic fertilizer to the garden soil by scratching it into the top inch or two of soil near (but not touching) your beans.

Most local nurseries and garden centers sell one or more brands of organic fertilizer. Large nationally-distributed brand names of organic fertilizers include Espoma, Dr. Earth, and Down To Earth, though your local store may carry a regional brand from your area. Any all-purpose garden or vegetable fertilizer (e.g. “Organic Vegetable Food”) will do just fine, including any product that features tomatoes in its name or picture (e.g. “Tomato Garden Fertilizer”).

Fertilizers have a set of three numbers printed on their bags, boxes, or labels. The numbers refer to the relative quantities of the three major plant nutrients: nitrogen (N), phosphate (phosphorus) (P), and potash (potassium) (K). A balanced fertilizer, such as one labeled with an N-P-K number of “5-5-5”, is adequate for beans, or you could use a “bulb” or “bloom” fertilizer with less nitrogen and more phosphate and potash (e.g. 3-6-6). I would use a little less than the amount of fertilizer recommended in the directions on your box or bag. Once you apply this to the soil, water it in well.

Inoculant

Some nurseries also sell inoculant for legume seeds. The inoculant looks like a little bit of black powder, and by dusting your bean seeds with it before planting them in the ground, you can improve their germination rates and health. This powder contains the nitrogen-fixing bacteria that enable your plants to generate this plant food. If you use inoculant, you will not need as much regular fertilizer. It is an especially good idea to use inoculant the first time you grow beans, after which the good bacteria will be present in your soil for a few

years. [If your local nursery does not carry inoculant for legume crops, you can find it here.](#)

Watering

Watering your bean plants is very important. They drink plenty of water as the vines grow upward and will need even more as the bean pods begin to form. Deep waterings are better than shallow ones, because they encourage a stronger root system, which makes the plant sturdier and more productive. The proper amount of water will differ based on your climate, temperature, and humidity.

If you're not sure when to water, stick your finger a knuckle or two deep into the garden soil near the plants. It may not be wet on top of the ground, but if you feel dampness an inch or two down, then you can wait to water. If it is dry, then give the ground under the plants a long, slow soaking, which allows the water to penetrate those first few inches and reach the deeper root systems.

To discourage leaf diseases, water the soil only and try to keep the plant's foliage dry. A drip irrigation system or a soaker hose can help keep the water at soil level. Another good practice, even if you water with a sprinkler or spray nozzled hose, is to water your plants in the morning so they have enough time to dry out by nighttime.

Watering plants in the morning is good for another reason, too: it leaves enough time for plants to warm up before nightfall. Beans are heat lovers and they will grow faster when they're warm. In all but the hottest climates, you want them to be as warm as possible when nighttime comes. It is a little known fact that most plants do the majority of their growing at night. If you cool them off with an evening watering, you will discourage a great deal of growth, whereas plants will have had plenty of time to warm up from a morning watering. In most climates, beans will grow a lot faster this way.

Beans need very little care. Once you have planted them, just keep them well watered. Or pole beans, make sure to train the young plants so that they climb their vertical supports. Simply wait until the plants start to send out their vining tendrils, and then help them wrap around the vertical supports; they will find their way up from there. Bush beans do not need any help climbing, since they are shorter and self supporting. Also, if pole beans' growth stalls out midway through the summer, apply a little more fertilizer to the soil around the plants and water it in with a deep soak. This should revive any plants that start to fade.

Mulching

Mulching is one more step you can take to ensure the success of your bean plants. Both pole and bush beans benefit from mulching. This is

the practice of covering the soil around their roots with a blanket of extra material, such as compost, leaves, grass or hedge trimmings, wood chips, newspaper, or shredded cardboard. Once bean plants are up and growing, cover the ground around them with a mulch blanket about 2-4 inches thick. Do not cover the plant itself; leave a little hole in the mulch where it grows.

Mulch insulates the plants' roots, protecting them from heat waves, cold snaps, and extreme temperature fluctuations. Mulch also absorbs water, preventing most runoff and evaporation. Mulching your plants can reduce water use considerably as well, keeping the ground moist beneath the mulch blanket. Your bean plants will be happier and bear more beans when mulched! The picture below shows young Fava Bean plants emerging from a well-mulched bed on a hillside.

Combating Diseases and Pests

Plant diseases and pests rarely knock out a crop of beans and peas, although they can reduce your productivity. They will be worse in moist climates. Keeping the foliage of your plants dry by watering into the ground (and not spraying the plant) will help reduce or eliminate leaf diseases. If you notice some mystery spots on your plants' leaves, take a look at [this page from LSU Ag Center](http://www.lsuagcenter.com/en/our_offices/departments/Plant_Pathology_Crop_Physiology/Plant_Disease_Clinic/Disease_Image_Gallery/Herbs_Vegetables/peas_beans/Diseases+of+Peas+and+Beans.htm) and see if it helps you to self-diagnose your issues. Link: http://www.lsuagcenter.com/en/our_offices/departments/Plant_Pathology_Crop_Physiology/Plant_Disease_Clinic/Disease_Image_Gallery/Herbs_Vegetables/peas_beans/Diseases+of+Peas+and+Beans.htm

Spraying the foliage with some diluted kelp extract (available at nurseries) sometimes stops diseases, perhaps by improving plant vigor. If all else fails, check nurseries and online retailers for an organic spray called Serenade[™]. It really works to eradicate or reduce a wide range of leaf ailments, including various strains of mildew.

As far as pests go, these vary by region. On bean and peas plants, it is relatively simple to check leaves for infestations. You can pick off larger bugs or spray them off with water ([I release my chickens to clean up an area before planting, but make sure they don't dig up the vegetables](#)). Aphids can be controlled with an organic soap spray or by releasing ladybugs, lacewings, or parasitic wasps (see if your nursery has these or order some online).

If you notice suspicious holes in leaves, check the undersides of leaves for worms; keep an eye on your plants, because even one worm can do a lot of damage if left unchecked for a few days. If birds eat your seedlings (which often happens with peas), cover your plantings with some plastic bird netting, which you can buy at a hardware store or nursery. Use some short stakes or cinderblocks to raise the level of the

netting above the young plants, and then remove netting after two weeks or so.



Chapter 12: Harvesting Dry Beans and Saving Your Own Seeds

To harvest dry beans, leave them in place until both the plants and pods have turned brown. If heavy rains or frost are in the forecast, you may want to jump the gun and take them out beforehand (giving them a little extra drying time after shelling). Harvest the pods and shell them, saving the pods husks as mulch for your other plants.

My kids love picking and shelling beans, and I recommend this as a great family harvest activity. You can cook the shelled beans right away or let them air dry for a few more days if you plan to store them for later use or as next year's planting seeds. To fully dry the beans for storage, you can set the bean seeds on a screen or baking sheet. Place them outdoors on a dry day or in a room with low humidity. In a few days, they should be dry enough to store.

Store bean seeds in a cool, dry, dark place, preferably in a tight container. Some good bets for containers include lidded Mason jars, a double locking zipper bags, or a plastic food storage containers with a tight lids. For small quantities, you can fill a whole Mason jar or plastic container with plastic baggies of different seeds (but make sure to label them so you remember which seed is which!).

For extra insurance against moisture, you can add small packs of silica

gel (like the kind in vitamin containers), a teaspoon or two of powdered milk, or a few kernels of brown rice in your container. Each of these additions can act as a desiccant that absorbs excess moisture. Bean seeds can be kept for years in a dark cabinet, inside a box, or inside your refrigerator, though it is best to use them each year and save more fresh seeds. If you're happy with the varieties you're growing, you will not need to order more!

Conclusion: Additional Resources on Heirloom Beans

As I mentioned earlier, I like growing modern varieties of green beans and Sugar Snap Peas, which are tender and completely stringless. In fact, I like some older varieties, too, such as immature runner bean pods and flat-podded Italian green beans. Because beans and peas are open-pollinated, most modern varieties can be saved and grown again without fear of contaminating the gene pool with hybrid varieties. So I do not feel guilty about growing them. However, when it comes to shelling beans and dry beans, I think it's more important to grow heirloom varieties.

Heirloom beans are an important part of our history and heritage. Heirlooms have complex flavors and textures that you cannot get from standard Pinto Beans, Kidney Beans, and the like. Try some different varieties, such as Yellow Eye Beans, Rio Zape Beans, Black Beluga Lentils, or Good Mother Stallard Beans. By continuing to grow and save the seeds of a treasured bean, you are doing the world an important service. Many heirloom varieties have nearly disappeared from the face of the earth, as they are not grown widely in the modern world of big agribusiness. By growing and saving heirloom beans, you are helping safeguard a legacy for future generations.

The seed companies listed in [Chapter 7](#) also provide a great deal of information on their websites and offer many heirloom bean seeds for sale there. If you have more than a passing interest in heirloom beans, here are several additional websites which provide more information on some really wonderful varieties. You can learn from them, for example, which kinds of heirloom beans make the best baked beans, bean soups, or salads. Of course, you may want to order a pound or two and try them out before planting. Just save a handful or two in case you like them. Put these in the ground come spring and you'll have your own garden of heirloom beans!

1. [Zursun Idaho Heirloom Beans](#). This site provides a great description of each type of bean and its best uses. In addition to dry beans and peas, there is a great section on heirloom Lentils. www.zursunbeans.com

2. [Rancho Gordo](http://www.ranchogordo.com). This is a great place to get some heirloom beans that you can try out and consider growing. For further reading, the proprietor has an excellent book on heirloom beans, which is available on this website. <http://www.ranchogordo.com>
3. [Sustainable Mountain Agriculture Center](http://www.heirlooms.org). This organization promotes sustainable agriculture in the Appalachian region, which also happens to have one of the world's greatest diversities of heirloom bean varieties. There are some great Appalachian and Southern beans here that you will not find for sale anywhere else. <http://www.heirlooms.org>
4. [Amishland Heirloom Seeds](http://www.amishlandseeds.com). Here is another regional heirloom site; this one comes from Pennsylvania Dutch country. The site describes a rich selection of unique green beans, dry beans, limas, and peas, some of which have been grown in the area since the 1700s. In particular, there are a lot of beans with purple and painted pods. <http://www.amishlandseeds.com>

In conclusion, I hope that you have enjoyed and benefitted from the information in this short book on beans. Please try planting a few seeds in the springtime. Come summer, you'll see Jack and the Beanstalk vines and you can pick some green beans or fresh peas. By late summer or fall, you will have plenty of mature bean pods for shelling or dry beans. Some brief words of warning: once you taste your own homegrown heirloom beans, it will be hard to go back to the store-bought kind. You might find that this "one-time hobby" becomes a life-long pursuit. Enjoy!

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Fall and Winter Gardening: 25 Organic Vegetables to Plant and Grow for Late Season Food

By R.J. Ruppenthal, Attorney/Professor/Garden Writer

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Chapter 1: Introduction: Late Season Gardening

When springtime comes, there's a natural impulse to plant. The warm weather and longer days of summer provide the perfect combination to ripen all those tomatoes, peppers, cucumbers, green beans, squash, and melons. With the bountiful harvest in and the late summer heat beginning to fade, it seems like a good time to dig up the garden, not start a new one. But with a little planning and care, fall can be a great time to grow vegetables and extend the bounty all year long.

This book describes 25 varieties of vegetables you can plant late and grow deep into the year for harvest in late fall, winter, and early spring. All the vegetables covered here are hardy in cool temperatures. They will thrive in cool fall weather and they can handle an early frost. Some of them can handle a hard frost and keep on trucking, particularly when they are protected using one of the techniques covered in this book.

Many of these vegetables can be stored during the winter and kept until you need them. A few of them can even be left in the ground and covered with a thick mulch blanket over the winter for the first harvest of the new year in early spring. All of them are delicious and can be eaten fresh or preserved by freezing, drying, canning, or pickling them for later use.

There are other cool season veggies that I have not included in this book. Brussels sprouts, parsnips, rutabagas, leeks, and garlic, for example, can grow well in the cool fall weather. I have left them out of this guide because they need to be in the ground for much of the year in order to produce a good crop. But you just picked your tomatoes and you don't have six months to wait until the weather turns cold. Instead, I have chosen to focus on 25 vegetables that can be planted and harvested relatively quickly in just 20-75 days from planting to harvest. These are the crops that not only can be harvested late, but planted late as well.

Chapter 2: 25 Vegetables for Cool Seasons

Here are basic descriptions and planting directions for 25 cold weather vegetables. All of them are vigorous plants that grow well from seed. There is some variation in the information provided for each one. For example, larger types of broccoli may need more space

to grow than smaller varieties. And the “Days to Maturity” figure is somewhat approximate, particularly since fall weather can be cool and vegetables can take a bit longer to mature.

Before proceeding, I must pay respects to the plant known as *Brassica oleracea*. This remarkable species provides us with a wide range of hardy cultivars: broccoli, cauliflower, kale, cabbage, collards, and kohlrabi. Even radishes, turnips, arugula, cress, and the Asian greens on this list are all closely related. Everything in this family is extremely nutritious to eat and tough enough to survive the cool weather of fall.

These brassicas (or cole crops, as they are often known), are the foundation of cold weather gardening. But don’t worry, this book will teach you how to grow potatoes, carrots, lettuce, beets, and many more vegetables beyond the brassicas. They will be some old favorites and a few vegetables you’ve probably never heard of or tasted!

Descriptions of the 25 vegetables are below. But first, here is a quick rundown on the format for each description. For each vegetable, I have included the following information as well as some specific growing tips and other relevant advice.

Name of Vegetable

Edible Portion: Describes which parts of the plant may be eaten.

Days to Maturity: Gives you the expected number of days from seeding or transplant to harvest.

There are two caveats here: First, some seed growers use this number to refer to “days from seeding to harvest” but most use it to mean “days from transplant to harvest”. This difference is significant, especially in the fall garden, where a few days can have a huge impact. Please assume that this number refers to “days from transplant to harvest”. If you are direct seeding, you will need to add some extra time to account for how long it takes the seeds to germinate and grow into seedlings fit for transplanting. Second, as I explain in an upcoming chapter, plants grow more slowly in cool fall weather than they do in the spring and summer. So just to keep our planning conservative, a little more time will be added to account for this.

Spacing: How far apart should you space seedlings? And if you are growing them in rows, how far apart should the rows be spaced? These numbers are geared towards traditional row culture, but if you

are gardening in raised beds or containers, you can squeeze the spacing a bit tighter. If you are planting seeds in the garden directly, a common practice is to plant more than you need and thin them (by pinching off the extra plants you do not need or pulling them up if this does not damage the remaining plants' roots). Unless thinning is mentioned in the plant descriptions that follow, please assume that each spacing suggestion describes proper spacing between thinned plants, not seeds. Feel free to plant seeds closer together and thin them to the spacing recommendation. We normally thin plants when their first true leaves (after the seed leaves) appear. By this time, we can judge which plants are healthiest and should remain, removing the others.

Planting: How deep should you plant the seeds? For the plants on our list, this ranges from 1/4 inch to one inch deep. For the ones that need 1/4 inch to 1/2 inch planting depth, I often do not plant them at all. I just scatter them and then cover them with a thin layer of soil or compost, followed by a good watering.

Temperature for Seed Germination: What are the minimum and optimum temperatures for this plant's seeds to germinate? This information is approximate, but it will give you a good idea of the range from cold to ideal. So if you want to direct seed your crops in cool weather, you know about how cold they can handle and still sprout up from seed. And you also know at what temperature they are happiest to sprout up. They normally germinate more quickly at this warmer temperature than at the minimum temperature, which is why late summer is a great time to plant a late season garden.

Germination Time: After planting seeds, how long can you expect to wait before seeing the little plants emerge from the soil? This is important because some of them are pretty long in cool weather, and you do not want to be waiting 21 days for germination if you are already cutting things close with the frost dates. If it's already cool outside and you need to get the seeds going more quickly, bring the little pots indoors, where room temperature is usually quite close to their optimum germination temperatures.

Transplant Seedlings at: This number is very approximate. I have tried to provide an expectation of how long to keep your seedlings in little pots before planting them out in the garden. There are some standard estimates available for each of these vegetables, but most of them are inaccurate because they are geared towards spring planting. Plants that are started from seed in late summer will enjoy warmer

temperatures than in the springtime. They will grow more quickly at the beginning, though once the weather cools down, they'll grow more slowly than spring crops. This means that you can plant out those fall seedlings a little sooner. The estimates for each vegetable are based on my research, but they are estimates only. Plant your seedlings a little earlier or later if you want.

And here are the descriptions for the 25 vegetables on our cool season list.

Arugula (Roquette)

- ☐ Edible Portion: Leafy greens
- ☐ Days to Maturity: 35 for baby leaves, 45-50 for larger leaves
- ☐ Spacing: Space seeds 4-6 inches apart in rows 6 inches apart
- ☐ Planting: Plant seeds ¼ inch deep
- ☐ Temperature for Seed Germination: 40 F (min.), 67 F (ideal)
- ☐ Germination Time: 5-7 days
- ☐ Transplant Seedlings at: 2-4 weeks

Arugula is a vigorous plant with green leaves that carry a sharp, peppery flavor. It has been a favorite at many gourmet restaurants. Young leaves are somewhat mild and can be eaten raw in salads. They are commonly used in salad mixes to provide an element of spice. Larger leaves are spicier and need to be cooked, which removes much of the sharp flavor. Those who enjoy the taste of arugula can use it as a spinach substitute in any recipe. Arugula is a great source of vitamins A and C as well as iron. Here is a picture.



Arugula (Roquette)

Beets and Chard

- ☐ Edible Portion: Roots (beets), leafy greens (chard)
- ☐ Days to Maturity: 55 for tender beets, 50-60 for chard leaves
- ☐ Spacing: Space seeds 4 inches apart for baby beets, 6 inches apart for larger beets, in rows 12-18 inches apart
- ☐ Planting: Plant seeds 1/2- 3/4 inch deep. When plants emerge, thin to strongest plant per cluster.
- ☐ Temperature for Seed Germination: 55 F (min.), 86 F (ideal)
- ☐ Germination Time: 7-14 days
- ☐ Transplant Seedlings at: 3-4 weeks

Both beets and chard come from the same species of plant, *Beta vulgaris*. While beets have been bred into a subspecies to maximize their root size, chard is used for its leaves and stems. Beets are sweet, earthy, and high in antioxidants. They are grown for sugar production in some parts of the world. Beets can be eaten raw in salads, roasted, or added to soups for a brilliant purple base. Chard can be used like spinach and added to soups, casseroles, pastas, rice dishes, and more. Beet greens can be cooked and eaten like chard. Each beet or chard seed actually is a cluster of seeds, so several little plants will emerge from the same location. Once they have two real leaves, choose the strongest plant and thin out the others. You can do this by pinching off the others or by pulling them out if this can be done without damaging the roots of the remaining plant.

Bok Choy (Pac Choi)

- ☐ Edible Portion: Leaves and stems
- ☐ Days to Maturity: 45-50
- ☐ Spacing: Space plants one inch apart in rows 18 inches apart.
- ☐ Planting: Plant seeds 1/4 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 75 F (ideal)
- ☐ Germination Time: 7-12 days
- ☐ Transplant Seedlings at: 2-3 weeks

Bok Choy is the classic stir fry vegetable in Chinese cooking. It usually has tender green leaves and succulent white stems, though some varieties have green stems (Ching-Chiang) or purple leaves (Violetta, Red Choi). Bok choy can be used as a substitute for cabbage or spinach in many recipes. Tender young leaves are good in salads as well. Like most Asian greens in the cabbage family, bok choy will bolt

and go to seed very quickly in warm weather, but fall is an ideal time to grow it.

Broccoli and Cauliflower

- ☐ Edible Portion: Florets, top parts of the stems, and leaves
- ☐ Days to Maturity: 60-70 (broccoli), 60-80 (cauliflower)
- ☐ Spacing: For broccoli, space plants 12-18 inches apart, in rows 24 inches apart. For cauliflower, which is larger, space plants 18-24 inches apart in rows 24-30 inches apart.
- ☐ Planting: Plant seeds 1/4-1/2 inch deep.
- ☐ Temperature for Seed Germination: 50 F (min.), 75 F (ideal)
- ☐ Germination Time: 5-10 days
- ☐ Transplant Seedlings at: 3-5 weeks

Broccoli and cauliflower are two of the most popular vegetables on our cool season list. You can eat them raw with dips, steam them, stir fry them, cook them in casseroles, blanche them for salads, and much more. Both plants are quite easy to grow and tend to be successful fall crops, which is not always the case with them in the spring. As day lengths shorten and temperatures begin to drop, the plants are much less likely to bolt. They are more likely to reward you with a mature head of florets for fresh eating. Most growers like to keep cauliflower heads white, which you can do by tying the leaves over the heads as soon as these heads reach 1-2 inches in width.

To prolong your broccoli harvest and increase its quantity, you can plant a “sprouting broccoli” variety. When you cut off the main head, it will produce more florets from side shoots, providing you with quite a bit more broccoli. Sprouting varieties to look for include Santee and Apollo (be sure not to confuse them with seeds used for “broccoli sprouts”, like the alfalfa sprouts used for sandwiches). Here is a picture of some purple broccoli below. Various types of broccoli and cauliflower produce heads in white, light green, dark green, orange, and purple hues.



Cabbage

- ☐ Edible Portion: Leaves and stems
- ☐ Days to Maturity: 60-90
- ☐ Spacing: Space plants 12 inches apart in rows 24-36 inches apart.
- ☐ Planting: Plant seeds 1/2 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 75 F (ideal)
- ☐ Germination Time: 5-10 days
- ☐ Transplant Seedlings at: 3-5 weeks

Cabbage, which grows in a great diversity of sizes, colors, and shapes, is one of the most popular vegetables. Cabbage makes a great addition to soups, casseroles, and other dishes. It can be chopped or shredded and eaten raw in salads. Its leaves can be steamed and used as wraps for rice and meat dishes. European style heading cabbages are the foundation for sauerkraut, while the Korean dish kimchi uses Napa cabbage as its base ingredient. Both of these fermented foods were developed as ways to preserve fresh cabbage and its valuable vitamin C over the winter months. Some cabbage heads store well over the winter as well.

Cabbage is extremely hardy and can handle both heavy frosts and snows, which only seem to improve the flavor. Large, heading varieties of cabbage take longer to mature than loose leaf cabbages. You can plant them as early as June and watch them head up into giant beach balls for fall harvest. If you plan to harvest the leaves at a younger stage before the plant heads up, then you can space plants closer together and pick them earlier.



Carrots

- ☐ Edible Portion: Roots
- ☐ Days to Maturity: 65-80 (earlier for baby carrots)
- ☐ Spacing: Space seeds one inch apart. If you plan on large carrots, you can thin them to two inches apart.
- ☐ Planting: Plant seeds 1/4 inch deep.
- ☐ Temperature for Seed Germination: 46 F (min.), 75 F (ideal)
- ☐ Germination Time: 10-21 days (at longer end of the range in colder soil)
- ☐ Direct seed only

Sweet, full flavored homegrown carrots are no match for anything you have ever bought from the store. I have never even tasted carrots from a farmers market or fruit stand that compares with what we have grown at home. Carrots are rich in beta carotene, which produces vitamin A, and they provide lots of important minerals and fiber. They taste delicious raw, either plain, in salads, or dipped in hummus or ranch dip. You can juice them, roast them, steam them, or cut them into soups, stir fries, beans, or pasta dishes. Kids love picking and eating them.

Carrots do not transplant well, so you must plant seeds directly into the garden. This is one of my regular crops, which I sow at intervals throughout the growing season. I do not follow any conventional planting directions. Because the seeds are so small, I just scatter them

on top of the soil, cover it with ¼ inch of compost, water well, and then thin out any plants that come up too close together (keeping the plants 1-2 inches apart).

Like most plants on our cool season list, carrots grow fine in containers. Here are some fall carrots harvested from an Earthbox container in our garden. The beans and cherry tomato were the last blasts from some summer plants that had frozen back. My kids picked these carrots and washed them. I held them back from eating these just long enough to snap a picture.



Cauliflower: please see “Broccoli and Cauliflower”

Chard: please see “Beets and Chard”

Chicory/Endive

- ☐ Edible Portion: Leaves, stems
- ☐ Days to Maturity: 45-65
- ☐ Spacing: Space chicory 2-3 inches apart, in rows 18 inches apart
- ☐ Planting: Plant seeds 1/4 inch-1/2 inch deep.
- ☐ Temperature for Seed Germination: 50 F (min.), 75 F (ideal)
- ☐ Germination Time: 7-21 days

☐ Transplant Seedlings at: 3-5 weeks

Chicory is a group of vegetables that includes some gourmet members: endive, escarole, frisee, and radicchio. Chicory, not lettuce, is the most widely used base for salads in Italy, and other European countries are not far behind in terms of its popularity. There is quite a bit of diversity in this family, from the tight heading red radicchio common in Italy to the blanched Belgian endive to the spiky leaved, mild flavored frisee favored by French chefs. Chicories are not all that popular in the United States and even major seed catalogs sell very few kinds. The best seed selection, and a good source of education on chicories, can be found at Johnny's Selected Seeds.

Collards and Kale

- ☐ Edible Portion: Whole plant, minus the roots
- ☐ Days to Maturity: 60-80
- ☐ Spacing: Space plants 18 inches apart, in rows 18-30 inches apart
- ☐ Planting: Plant seeds 1/4 inch-1/2 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 75 F (ideal)
- ☐ Germination Time: 5-10 days
- ☐ Transplant Seedlings at: 4-6 weeks

Collards and kale are in the same family as cabbage, broccoli, cauliflower, kohlrabi, and many of the Asian greens. Both are at the top of the vegetable nutrition charts, packing whopping amounts of vitamins, minerals, and antioxidants into each serving. Collard greens are a traditional favorite in the southern United States, often fried in oil or lard with onions or bacon added. Kale, which makes great soups, is one of the most winter hardy vegetables which only seems to sweeten after a good frost. The names of kale varieties like Red Russian, Siberian, and Winterbor attest to its hardiness.

Proper spacing depends on how big you want to let your plants get; the leaves can be harvested young or you can let the plants grow large enough to take over several square feet in the garden. Begin by spacing plants 6 inches apart, in rows 18-30 inches apart, until baby leaves can be picked at around 30 days. Then begin harvesting whole plants to give the remaining plants 18 inches of spacing between plants to grow larger.

One way or another, I usually end up with a lot more kale than my family will eat by the end of the year, which I usually harvest and

juice. I then freeze the dark, nutrient rich juice into ice cube trays and pop these ingots of condensed nutrition into freezer proof containers. Each time we cook something like beans, pasta, or pizza, I shave in a little frozen kale juice that is rarely noticed. What the kids don't know won't hurt them (and, in fact, should make them stronger). Entire ice cubes can be hidden in some soups.

Kale: Please see “Collards and Kale”

Kohlrabi

- ☐ Edible Portion: Bulbs (enlarged stems)
- ☐ Days to Maturity: 40-80
- ☐ Spacing: Space plants 4-5 inches apart, in rows 24 inches apart
- ☐ Planting: Plant seeds 1/4 inch-1/2 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 75 F (ideal)
- ☐ Germination Time: 5-17 days
- ☐ Transplant Seedlings at: 4-6 weeks

Though kohlrabi is in the same brassica family as many plants on our list, it provides a nice change of pace from all the leafy greens. Kohlrabi forms an edible swollen stem just above ground that is sweet, flavorful, and delicious. These spiked balls look like something from another planet. Though it is not a root vegetable, the taste and texture are perhaps most similar to a mild and tender Daikon Radish. Kohlrabi tastes great in stir fries and can be used like a root vegetable in soups and stews. But it really excels as a raw vegetable when eaten plain or with a dip. Pick it when it is small, with a bulb no wider than 2 inches, for best flavor. Larger bulbs with their tops removed can be kept in storage over the winter to provide 2-3 months of fresh eating. Superschmeltz is the largest storage variety, producing 8-10 inch wide bulbs. The picture below shows green and purple kohlrabi bulbs.



Lettuce

- ☐ Edible Portion: Leaves and stems
- ☐ Days to Maturity: 40 (baby leaf lettuce), 50-65 (full sized heads)
- ☐ Spacing: For baby leaf harvest, sowing seeds one inch apart is adequate in rows 18 inches apart. For full sized lettuce, space plants 8-10 inches apart (leaf types) or 12 inches apart (heading types).
- ☐ Planting: Plant seeds 1/4 inch deep or sow them and cover with a thin layer of soil or compost
- ☐ Temperature for Seed Germination: 40 F (min.), 60 F (ideal)
- ☐ Germination Time: 2-14 days (longest in cool weather)
- ☐ Transplant Seedlings at: 3-5 weeks

Lettuce is the essential base for our favorite salads. It comes in many more shapes and sizes than what you see in the grocery store. There are Crisphead, Butterhead, Looseleaf, Romaine (Cos), and Batavian lettuces with many varieties in each of these groups. You can pick baby leaf lettuce in just over a month from planting or grow it to full size and harvest full sized heads for a big salad from each one. If growing leaf lettuce to a large size, you can keep harvesting individual leaves on a “cut and come again” basis. To do this, use a sharp knife and cut the leaves about two inches above the base. The plants will have enough energy to keep growing and producing more leaves, which can continue for quite awhile in cool weather.

Whatever kind you grow and however you choose to grow it, lettuce

is a good candidate for multiple plantings throughout the growing season. I make a small planting of new lettuce (enough for a few salads) as often as every 2-3 weeks from early spring into winter. If some of it is lost during a heat wave in August or a killing frost in December, I have only lost a few plants and I just keep planting more. We generally have more than we can eat, which we feed to [the chickens in our backyard](#). With all that vitamin A, they make great fresh eggs with deep golden yolks.

As with some of the other vegetables on this list, you can have the best of both worlds with baby leaf lettuce and full sized lettuce. Just plant the seeds at one inch intervals and then start thinning them into your salad when they get to an edible size. If you like microgreens, you could start thinning in the first few days, but otherwise, you could wait until the plants have a few true leaves. Keep thinning until you get to the recommended spacing intervals for full sized leaf lettuce (8-10 inches apart) or head lettuce (12 inches apart), leaving one plant in each interval to mature.

Mache (Vit)

- ☐ Edible Portion: Leaves and stems
- ☐ Days to Maturity: 50
- ☐ Spacing: Mache is a very small plant. You are fairly safe just scattering the seed on a bed and covering it with ½ inch of soil or compost. Alternatively, you can space seeds an inch apart in rows 8 inches apart.
- ☐ Planting: Plant seeds 1/2 inch deep.
- ☐ Temperature for Seed Germination: 41 F (min.), 60 F (ideal)
- ☐ Germination Time: 10-15 days
- ☐ Transplant Seedlings at: 4-5 weeks

This mild little vegetable is known by several names: mache, vit, corn salad, and lamb's lettuce. The flavor is very mild, slightly nutty, and pleasing. Mache is one of the most widely consumed greens in Britain, Germany, Spain, and France, and it has become naturalized as a weed in many European gardens. This may be the origin of the name "corn salad" which probably came about because the plant grew in the field between the stalks of corn.

The mache plant grows small leaves in a rosette. Once it reaches 2-3 inches in height, it is ready to harvest, and you can use a knife to cut it off at the root. The whole plant can be used raw in salads or cooked like spinach. It is high in vitamins A, B6, and C, contains lots of

omega-3 fatty acids, and provides more iron than spinach. Here is a picture of a mache plant growing.



Miners Lettuce (Claytonia)

- ☐ Edible Portion: Leaves, stems, and flowers
- ☐ Days to Maturity: 40
- ☐ Spacing: Plant 6 inches apart, in rows 12 inches apart
- ☐ Planting: Plant seeds 1/4 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 60 F (ideal)
- ☐ Germination Time: 2-15 days
- ☐ Transplant Seedlings at: 3-4 weeks

Miners Lettuce is extremely cold tolerant. In most of the United States, it can grow through the winter in unheated greenhouses, growing tunnels, or cold frames. The plant has attractive heart or disk shaped leaves on a long stem. As the plant grows, a small flower stalk emerges from the center of each leaf pair. You can eat it all: leaf, stem, and flower. The plant is high in vitamin C, omega-3 fatty acids, minerals, and antioxidants.

As the name indicates, this plant grows wild in many places. One of those places is my backyard, where I never planted it. Each year, a patch of Miners Lettuce comes up in the back corner. We eat a few salads' worth and then I let the rest of it grow, carefully collecting the seeds and scattering them around the back lawn. Each year, there are a few more plants and the patch spreads. To me, this is a much better way to use the yard than having a grassy lawn. I only wish it grew for more than a few months each year because I love having it for salads.

Maybe I'll have to plant some of those seeds in my garden beds.

Orach (Mountain Spinach)

- ☐ Edible Portion: Leaves
- ☐ Days to Maturity: 45
- ☐ Spacing: Plant one inch apart, thinning to 6 inch spacing, in rows 12-18 inches apart
- ☐ Planting: Plant seeds 1/4 inch-1/2 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 60 F (ideal)
- ☐ Germination Time: 7-15 days
- ☐ Direct seed only

Orach is an underappreciated vegetable in the spinach family, which also is related to wild lambsquarters. It bears some similarities to spinach with its arrow shaped leaves and their savoyed curls. But its palette of colors is quite unique, ranging from emerald green to deep purple to bright magenta. Orach makes a great addition to mixed salads and can be cooked like spinach as well.

If you decide to plant Orach, just seed it directly in the garden, as it does not transplant well. There is good news and bad news regarding the seeds. Unfortunately, Orach seeds can be hard to find and they are expensive, since this plant is not widely grown in the United States. Look for the purple and magenta leaved types, which produce vibrant colors that look great in salad mixes. On the plus side, you will not need to spend more money on Orach seed. This must be one of the most prolific seed producing plants in the vegetable garden and the seeds stay on the plant for easy picking. You can save all you want for your next planting and still have a lot left to give away. This picture shows Orach's intense colors.



Parsley

- ☐ Edible Portion: Leaves and stems. Hamburg parsley produces an edible root.
- ☐ Days to Maturity: 75-80
- ☐ Spacing: Space peas at least 6-8 inches apart in rows 12 inches apart.
- ☐ Planting: Plant seeds ½ inch deep
- ☐ Temperature for Seed Germination: 45 F (min.), 75 F (ideal)
- ☐ Germination Time: 10-21 days
- ☐ Transplant Seedlings at: 4-6 weeks

Parsley is a green, leafy plant in the carrot family. Both curly leaved and flat leaved (Italian) varieties are grown commonly in home gardens. The plant is biennial, meaning that it grows on a two year life cycle. Therefore, even if its leaves die back, it may come up again the next spring, but it will be looking to flower and seed pretty quickly the second time around. Most people grow parsley as an annual and just remove the plant when it is finished for the year.

Parsley has a mild flavor that most people like. It is quite nutritious, packing large amounts of vitamin A and K, folate, iron, and calcium. While parsley is grown as an herb in the west, people in the Middle East use parsley more like a vegetable. Tabbouleh is a bulgur wheat salad, but the grain is not the main ingredient: chopped, flat-leaf parsley has the starring role, supported by chopped mint, tomatoes, green onion, and perhaps cucumber and other vegetables. The dressing is heavy on the lemon juice and salt for a wonderfully sour, salty, mildly minty, and definitely parsley-ey taste. A good tabbouleh will help you believe that parsley should be classified as a vegetable,

not an herb. Also, look for Hamburg parsley, which produces an edible root like a carrot.

Peas

- ☐ Edible Portion: Seeds, seed pods, shoots
- ☐ Days to Maturity: 10 for shoots, 60 for pods and small peas
- ☐ Spacing: Space peas at least one inch apart in rows 12-18 inches apart.
- ☐ Planting: Plant seeds ½ inch-1 inch deep.
- ☐ Temperature for Seed Germination: 40 F (min.), 80 F (ideal)
- ☐ Germination Time: 9-36 days (at longer end of the range in colder soil)
- ☐ Direct seed only

Peas are a close relative of beans. Beans are easily divided into two groups: pole beans and bush beans. For some reason, no one uses these same designations with peas, even though there are taller and shorter varieties of them also. Instead, peas usually are divided into shell peas (where you eat only the seeds), snap peas (where the whole pod is sweet, tender, and edible), and snow peas (with an edible pod that is flatter and not as sweet, commonly used in Asian stir fry dishes). Here is a picture of some Sugar Sprint peas growing in my garden in front of some Rouge d'Hiver Lettuce.



Many modern varieties grow on dwarf vines that reach only 2-3 feet in height. These are the kinds you want for fall gardening, because they are faster to mature than the ones that reach 4-5 feet tall or higher. Tall varieties also need to be staked or trellised, whereas most types of snap peas remain under 30 inches and do not need support. I recommend the following varieties for fall gardening, which are all short vined and offer quick harvests. *Sugar Snap Peas*: Sugar Snap, Sugar Ann, Sugar Sprint, Cascadia. *Shelling Peas*: Green Arrow, Maestro, and Dakota. *Snow Peas*: Dwarf Grey Sugar (best variety for edible shoots), Mammoth Melting, Oregon Sugar Pod.

Potatoes

- ☐ Edible Portion: Tubers
- ☐ Days to Maturity: 60-80 (early types), 80-100 (midseason types), 100+ (late types)
- ☐ Spacing: Space seed potatoes 12 inches apart, in rows 30 inches apart
- ☐ Planting: Plant seeds 6-9 inches deep
- ☐ Temperature for Seed Germination: 40 F (min.), 65 F (ideal) for sprouting
- ☐ Germination Time: Immediate, when seed potatoes are sprouting
- ☐ Plant seed potatoes directly; do not transplant

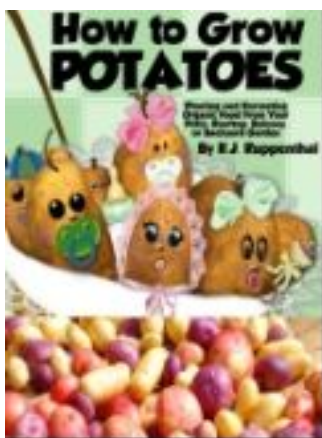
Potatoes are classified here as a vegetable, but their carbohydrates make them more of a grain substitute and food staple. They can be roasted, fried, mashed, steamed, boiled, baked, and prepared in numerous ways. Most potatoes are classified as baking or boiling types. Baking potatoes are starchy and floury; they also lend themselves well to mashing or frying. Good baking types include Goldrush, Red Pontiac, All Blue, and the Russet types. Boiling potatoes, such as Red Norland, Yellow Finn, and the fingerling types, are waxier and have a higher moisture content. Boilers are better for roasting, barbecuing, or boiling for potato salad.

Though potato seeds exist, it is much more efficient to plant seed potatoes, which are either small potatoes or chunks of larger ones. Each seed potato needs to have at least one “eye” which will sprout into the potato’s growing shoot. You can sprout potatoes you buy from the store or order certified disease free seed potatoes from a reputable supplier, which will give you access to early, mid season, and late maturing varieties, including many delicious varieties you have never

tasted before. My favorite places to buy seed potatoes are [Irish Eyes Garden Seeds](#), [Potato Garden](#), and [Fedco Seeds' Moose Tubers](#).

Planting them 6-9 inches deep is about right. Potato production increases if you “hill” the potatoes. When the leaves emerge from the ground and their stems are 6-8 inches high, mound up some soil or mulch around the base of the plant to cover part of the stems (but not the leaves). When the potato stems grow out again, mound up some more soil. You can do this several times and the potato plants will root from the buried stems, producing more tubers from those roots.

Potatoes grow extremely well in containers, including large pots, tubs, and barrels. I highly recommend trying [fabric pots](#) or [growing bags](#), which I have found to be the most successful for spuds. These cloth or plastic containers have small holes on the sides and bottom of the container, which prunes the roots and forces them to branch out, again creating more space for spud production. They also keep the soil in a good temperature range, which is warmed by the dark colored container material, yet kept from overheating by the aeration on the sides. I challenge anyone to grow a greater quantity of spuds in the equivalent amount of space in a regular garden row or even a raised bed. I do not think the productivity of fabric pots and growing bags can be beat, except by an extreme vertical growing method. For more in-depth information on these methods, and on growing spuds in general, please see my e-book entitled [How to Grow Potatoes: Planting and Harvesting Organic Food From Your Patio, Rooftop, Balcony, or Backyard Garden](#).



Radishes

☐ Edible Portion: Roots, leafy greens

- ☐ Days to Maturity: 21-30 days
- ☐ Spacing: Space seeds 1-2 inches apart, in rows 12-18 inches apart
- ☐ Planting: Plant seeds 1/2 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.),
- ☐ Germination Time: 4-10 days
- ☐ Direct seed only

Radishes often win the prize for the earliest finishers. In cool, spring weather when summer crops cannot be planted yet, home gardeners across the country are picking their first radishes. They can be grown in the fall, too, even in short season climates. There are many different kinds of radishes from the small Cherry Belle and French Breakfast radishes to the giant white daikons which add a mild sweetness in Asian cooking.

The leaves are pretty rough, but are quite edible once they're boiled. They taste great in soups. Follow spacing instructions above for small, salad-type radishes. For longer radishes and daikon, follow planting directions on seed packet label. Radishes make great pickles and fermented dishes. Here is a picture of some different kinds, including the pink-hearted Watermelon Radish, being pickled in a jar.



Scallions (Green Onions)

- ☐ Edible Portion: Immature bulb and stalk
- ☐ Days to Maturity: 60-65 days
- ☐ Spacing: Space seeds 1/4 inch-1/2 inch apart, in rows 18 inches apart
- ☐ Planting: Plant seeds 1/2 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 70 F (ideal)
- ☐ Germination Time: 6-12 days
- ☐ Transplant Seedlings at: 4-8 weeks

Scallions, also known as green onions or bunching onions, are immature onion plants that are picked and eaten before they can create a bulb. Scallions can be chopped and cooked like onions in almost any dish. They can be eaten raw if you like their zesty flavor, which is a little stronger than chives. They make a great accent in salads or as a topping for baked potatoes.

Bulbing onions take many months to grow, but you can harvest scallions within two months of first sowing. While scallions are just onion plants picked early, there are several varieties which have been developed specifically for this stage of harvest. Most seed suppliers sell seeds for bunching onions, while some of the better nurseries also carry onion starts or seedlings that you can transplant into your garden. Evergreen and Parade are two commonly sold varieties that grow straight as an arrow, while Guardsman and Purplette may taper to a small bulb.

Spinach

- ☐ Edible Portion: Leaves and stems
- ☐ Days to Maturity: 40-50 days
- ☐ Spacing: Space seeds 1-2 inches apart for baby leaf spinach or 3-5 inches apart for larger leafed plants, in rows 14-18 inches apart
- ☐ Planting: Plant seeds 1/2 inch deep.
- ☐ Temperature for Seed Germination: 40 F (min.), 75 F (ideal)
- ☐ Germination Time: 5-12 days (at longer end of the range in colder soil)

Spinach is the default leafy green vegetable for cooking. The young leaves can be eaten raw and make a delicious salad base. And of course spinach can be cooked in every kind of dish from eggs to lasagna. Spinach is extremely nutritious, providing large amounts of vitamin A, vitamin C, folate, iron, zinc, and other minerals with each

serving. As Popeye the Sailor Man said, “I’m strong to the finish when I eats me spinach.” Fortunately, you won’t need to eat it from a can, and the homegrown kind is much better tasting.

Spinach plants, like the other leafy greens on this list, thrive in cold weather. It is one of the fastest fall vegetables you can grow, bringing you a harvest of baby greens in just over five weeks. The plants can be spaced very close together if you are growing them for baby greens.

Some varieties of spinach are better suited to spring production than fall production, so it is worth buying the right kind of seed. Seedlings sold in nurseries are not necessarily the best kind, and often they are simply labeled as “Spinach” with no variety listed. Bloomsdale, an old heirloom variety with, is the standard fall favorite. Also look for Giant Winter Spinach, Dolce Vita, Renegade, and Samish. Like Bloomsdale, the savoyed (curly) leaf types tend to perform the best in cold weather.

Tatsoi

- ☐ Edible Portion: Leaves and stems
- ☐ Days to Maturity: 45-50 (earlier for baby greens)
- ☐ Spacing: Space plants one inch apart in rows 18 inches apart.
- ☐ Planting: Plant seeds 1/4 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 75 F (ideal)
- ☐ Germination Time: 5-15 days
- ☐ Transplant Seedlings at: 2-3 weeks

Tatsoi is an Asian green with a savoyed, spinach like leaf. The small leaves grow in a very attractive, multilayered rosette. They can be picked at any stage and always stay very mild and tender. Tatsoi leaves are great in salads and they can be cooked as a substitute for spinach in any kind of dish.

Turnips

- ☐ Edible Portion: Roots, leaves
- ☐ Days to Maturity: 45-65 days
- ☐ Spacing: Space seeds 1-2 inches apart, in rows 12-18 inches apart
- ☐ Planting: Plant seeds 1/4 inch-1/2 inch deep.
- ☐ Temperature for Seed Germination: 40 F (min.), 75 F (ideal)
- ☐ Germination Time: 5-10 days

- ☐ Direct seed only

Turnips are dome shaped root vegetables that provide a great flavor to cooked dishes. In particular, they taste great when roasted, mashed and seasoned like potatoes, or added to soups. While they resemble potatoes when cooked, they have many fewer calories and also provide plenty of vitamin B6, vitamin C, potassium, and calcium. Turnip greens can be cooked as well, adding a strong dose of vitamin A and additional minerals.

Turnip roots should be picked when small and tender (no wider than three inches), as they are much tastier at this age. However, if you are planning to store cut roots over the winter, then larger ones probably store well with their tougher skins and lower moisture content. The standard turnip variety that is grown most often is called Purple Top White Globe, while Golden Globe (or Golden Ball) is also common. Some newer varieties of turnip that are picked small and eaten raw like radishes include Scarlet Queen, Scarlet Ohno, and White Egg. Occasionally, you will see leafy varieties of turnip being marketed by seed suppliers as forage food for livestock. Here is a picture of the standard Purple Top White Globe kind.



Watercress (Upland Cress)

- ☐ Edible Portion: Leaves, stems
- ☐ Days to Maturity: 45-65 days
- ☐ Spacing: Space plants 6 inches between plants, in rows 12-18 inches apart.
- ☐ Planting: Plant seeds 1/4 inch deep.
- ☐ Temperature for Seed Germination: 45 F (min.), 65 F (ideal)
- ☐ Germination Time: 3-10 days

Watercress is a challenge to grow in the home garden, but Upland Cress provides a very similar leaf and flavor. It is also very easy to grow and was used for providing winter vitamin C in colonial times. Upland Cress has a sharp, spicy flavor that can liven up a late season salad. These plants are very hardy and can survive some ugly frosts. In all but the coldest climates, they should keep on growing right through the winter.

Be careful about leaving it too long, though, because this cress can naturalize and do a pretty good impression of weed. I planted some Upland Cress which escaped my raised beds and took over a patch of the walkway. When planting, you can sow the seeds one inch apart in row and begin thinning out the extra plants into your salads 10 days after plants emerge. Eventually, six inch spacing is best. Always give Upland Cress plenty of water, though it is not an aquatic plant like its better known relative.

Chapter 3: Starting Vegetables from Seed

There are three ways to start plants for your garden. The first way is to plant seeds directly into the garden soil, whether this is in a container, raised bed, or garden row. The second way is to start the seeds in small nursery pots and then transplant the seedlings into their eventual garden home. And the third way is to purchase seedlings at a nursery that you can plant. For various reasons, the first two approaches are best.

Direct seeding is much easier to do in the later summer than in the early spring, when most seeds are sown. In the springtime, the temperatures are still cool and variable, whereas most fall and winter crops are planted in more favorable weather. Late summer warmth helps seeds germinate quickly and gets plants off to a good start before the weather begins to cool. Also, there is a far better selection of cool weather vegetables available from seeds than from seedlings. A good seed supplier may carry as many as ten varieties of broccoli, while you would be lucky to find one variety of broccoli seedling at your local nursery. You may be missing out on some faster, more productive, tastier, disease resistant, and unusual varieties.

Growing your own seedlings and then transplanting them into the garden is a good option also. This approach still saves you money over buying seedlings, and it gives you the great selection of seeds.

Growing your own seedlings is as easy as buying the seeds and planting them in small plastic pots. Once your seedlings get big enough, you can transplant them into the garden. You do not need grow lights, heat mats, or indoor greenhouses to start these seeds. Just grow them outside, since late summer has plenty of light and heat to get these plants off to a good start.

As a practical matter, very few nurseries offer a good selection of veggies for late season planting. Once the crowds of tomato planters have moved through, the nurseries tend to focus on other lines of business besides seedlings. At best, you may find a few broccoli, cabbage, and lettuce seedlings. Some of these may have been sitting on the shelf for long enough that their roots are tangled and their leaves are yellowed. If your nursery carries a better selection than this and brings in fresh stock of fall vegetable seedlings every few days, then you should be thankful because it is one of the few.

Transplanting does not work well for orach, peas, potatoes, carrots, radishes, or turnips (which prefer to be planted directly in the garden), but using this method for other vegetables on our list can save you some very valuable time. If you have limited growing space and are not ready to take out your summer tomatoes to make room for fall vegetables, then this can buy you a few extra days as well. Of course, both direct garden seedling and growing seedlings requires that you have access to high quality seeds.

I have purchased seeds from a lot of different sources in the past. Most of them sell you smaller packets of what has been left over from their larger commercial suppliers. I have bought seeds before that were old, unable to germinate, or even mislabeled as a different variety (which you find you the hard way much later). On the opposite extreme are a few great seed companies which reliably offer fresh seed that germinates quickly and grows strong plants that comply perfectly with their catalog and website descriptions. Here is a list of the best seed companies I have found. Without recommendations from people I trust, I will not buy seeds from anywhere else.

If you have a newer version of Kindle or are reading this on your computer or in the online Cloud Reader, you should be able to click these companies' names to be linked to their sites. If you are using an earlier Kindle reader, then you can find these same websites listed in the Resources section at the end of this book.

1. **Johnny's Selected Seeds.** Johnny's is the gold standard for garden

seeds and offers the best selection of fall vegetables. When you browse the listings for carrots, spinach, broccoli, or other veggies on our list, you will see that Johnny's often recommends certain varieties for spring and others for late season planting. Their folks work diligently to research and test the best varieties of vegetables, particularly those that succeed in cold climates and offer good disease resistance. Every seed packet I have ordered from Johnny's has contained the absolute highest quality seeds. If you live in the Northeast, mid-Atlantic, or Upper Midwest, these seeds will be particularly well suited to your regions. I do not live in any of those regions, yet this is still my first stop.

2. **Territorial Seed Company.** Territorial is another terrific seed supplier which puts a lot of effort into developing and testing the best varieties. I have never gone wrong ordering from them. They have an excellent selection of fall vegetables as well, though not quite as extensive as Johnny's. Territorial's seeds are particularly well suited for anyone on the West Coast.

3. **Park Seed.** Park Seed also offers very reliable seeds of high quality which have tested well in their own gardens. This is an ideal seed source for southern gardeners, many of whom can grow vegetables right through the winter with little or no frost protection.

4. **High Mowing Organic Seeds.** This small Vermont company has built a successful business by growing and selling only organic seeds. They may not have as many choices as larger seed houses, but they also do not stick to the safe, popular mainstream varieties. They pick the best ones which are most likely to succeed and give you some great food. I have come to trust both their quality and their selection of varieties in each category. And I love supporting an all organic small business.

5. **Peaceful Valley Farm and Garden Supply.** Peaceful Valley may be an unusual choice to appear on this list because it is not really a seed house. As its name indicates, this is a supply store for farmers and gardeners. I include it here because these folks also sell seeds and I have had good success with them. If you happen to need some supplies (anything from tools to fertilizers to organic insect control to chicken coops), they throw in free seed packs when you buy enough other stuff. You get to choose a certain number of free seed packets when you buy \$50, \$100, etc., worth of other products. So if you need to equip your garden, you can get free seeds.

At most times of the year, it takes only a week or two for your seeds to ship out. Seeds are normally packed fresh after the previous year's growing season, so most people order them in the wintertime or early spring for spring planting. For fall planting, you can order seeds in the springtime and summer also, but beware that popular varieties can sell out by then. I usually order them by early spring (if I remember) and keep the fall seeds in a cool, dark cabinet until I'm ready to use them.

Once you get your seeds and your garden is ready for them, follow directions on the packet for planting. Proper planting depth, plant spacing, growing tips, and estimated times for germination, transplanting, and harvest for cool season vegetables are covered in the previous chapter. If you are planting seeds in small pots to be transplanted later, try 3-4 inch plastic nursery pots. You can grow them outside, but make sure you keep them well watered as small pots can dry out quickly in summer heat. During hot spells or in very warm climates, you may want to place the seedling pots in an area that gets some afternoon shade.

Chapter 4: When to Plant in Your Area

Most crops for fall and winter harvests should be planted between June and September. Your best planting date will depend on two variables: what you're planting and when the weather gets really cold in your area. Fast crops like radishes and baby leaf lettuce can be harvested just a few short weeks after seeding, which means you can plant them quite late. On the other hand, carrots require at least two months to grow, so you need to plan well and put them in the ground in late summer.

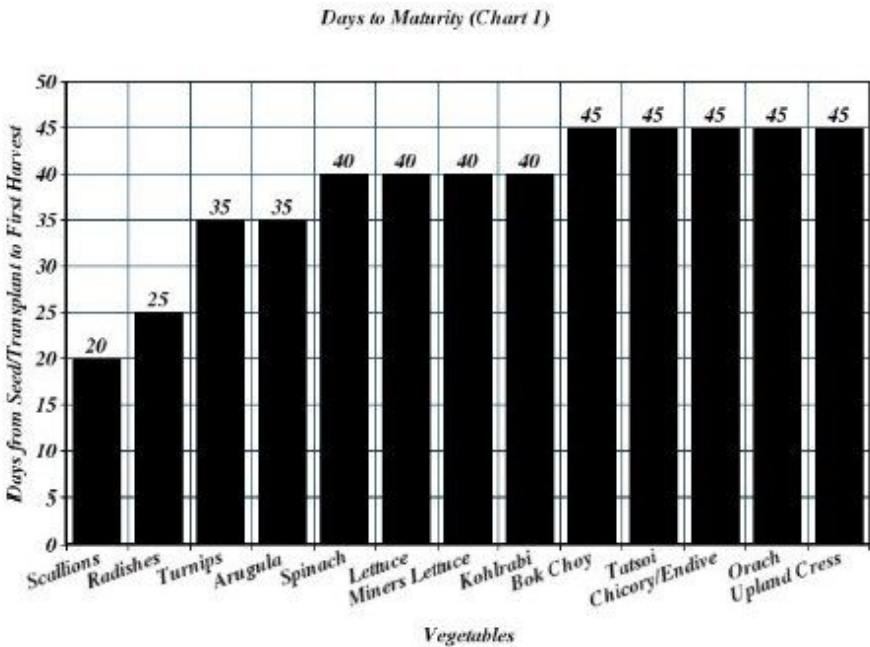
Every plant we cover here is pretty hardy and can handle a light frost. But young, tender plants cannot stand up to extreme cold. You need to give them a head start so they can get big enough before frost is expected to arrive. Once you know when frost is expected to arrive, you can count backwards the number of days it takes to grow a particular vegetable. That provides you with the safest planting date.

The information in the following sections will help you determine when to plant particular vegetables for the latest possible harvest in your particular area. Please bear with me, since there is a lot of information to cover first, but I think it is worth spending the proper time to understand this well. This knowledge will empower you to plan your late season garden. And I promise you we will put all this

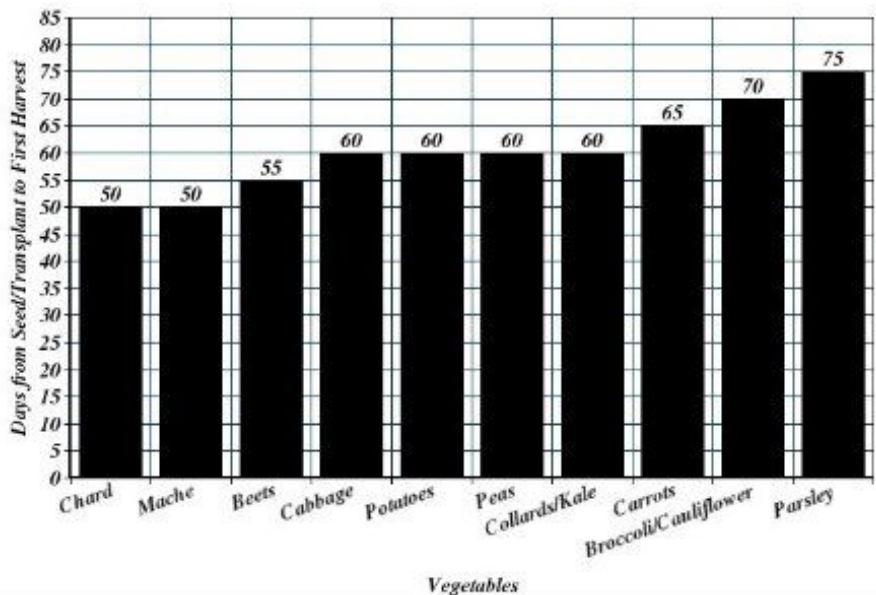
information together very soon and help you find the best planting times. Of course, it all depends on what veggies you want to grow and when your area gets frosty...

Growing Times for Vegetables

The two charts below show the estimated days to maturity for each vegetable covered here. The numbers show the amount of time it takes from planting until the earliest expected harvest date (excluding immature stages, such as baby leaf lettuce). During cool weather, plants will require more time to grow than this, so to account for this and play it safe, **please add three weeks (21 days) to each number below**. The numbers in these charts should give you a starting point to begin your planning. (By the way, if you have trouble reading the “Days to Maturity” charts on your Kindle screen, do not worry. The same information is included in the descriptions of each of the vegetables, which appeared [in Chapter 2](#)).



Days to Maturity (Chart 2)



Organic veggies, including purple kohlrabi, scallions, beets, oriental greens, and arugula

Finding Your Frost Date

To find the last possible planting date for a particular crop in your climate, you can begin by finding your first average frost date in the fall (not to be confused with your last average frost date, which occurs in the spring). Knowing your first average frost date will help you determine how late you can plant and grow vegetables in your area. The list below shows you the first average frost dates for each state's capital city. If you want to find a more specific listing for the city closest to you, [click here to find its frost date from the Victory Seeds website](#). If you live outside the United States, check with the agriculture department in your province or administrative region.

Frost dates can vary widely in large or geographically diverse states. For example, Florida's capital city (Tallahassee) has a first average frost date of 10/28, while its largest city (Miami) has no frost. First frost dates in Nevada range from August to November. And these will always be approximate, because even local microclimates have a great deal of variation. The temperature can vary by as much as 10 degrees from a hilltop to a valley bottom. As a result, these dates merely provide a place to start, and from there you will need to rely on your own observations.

Here are the first average frost dates for the capital cities of each state, plus the District of Columbia.

Alabama: 10/29

Alaska: 9/5

Arizona: 11/18

Arkansas: 10/27

California: 11/14

Colorado: 9/20

Connecticut: 9/23

Delaware: 10/21

District of Columbia: 10/23

Florida: 10/28

Georgia: 10/25

Hawaii: none

Idaho: 9/22

Illinois: 10/6

Indiana: 10/7

Iowa: 9/21

Kansas: 10/1

Kentucky: 10/10

Louisiana: 11/4

Maine: 9/22
Maryland: 10/11
Massachusetts: 10/5
Michigan 9/18
Minnesota: 9/21
Mississippi: 10/14
Missouri: 10/1
Montana: 9/2
Nebraska: 9/30
Nevada: 9/2
New Hampshire: 9/8
New Jersey: 10/23
New Mexico: 9/30
New York: 9/19
North Carolina: 10/21
North Dakota: 9/7
Ohio: 10/3
Oklahoma: 10/21
Oregon: 9/28
Pennsylvania: 10/4
Rhode Island: 9/17
South Carolina: 10/21
Tennessee: 10/14
Texas: 11/5
Utah: 9/29
Vermont: 9/8
Virginia: 10/13
Washington: 9/30
West Virginia: 10/5
Wisconsin: 9/25
Wyoming: 9/9

Once you start growing in the fall and begin to take note of the first frost date, you might realize that it often seems inaccurate. You may go through three years where the actual first frost occurs weeks later than this prediction, which may give you false confidence that you can push things further into the fall. The next year, frost comes 10 days before the average date and kills all the young plants in your garden. Remember, the date is an average, not a guarantee. And local climate conditions often move in cycles, with a few warm years followed by some really cold ones.

Killing Frosts

For most gardeners, the frost you really need to worry more about is the first hard frost or “killing frost”. This is when the mercury falls to 28 degrees (F) or below, killing leafy growth on even some of the hardiest vegetables. The U.S. Climatic Data Center [provides a helpful tool for judging the probability of when the first hard frost will arrive in your area](#). This data is not as easy to interpret as a simple frost date, but it provides 10%, 50%, and 90% likelihoods on a particular date of the temperature reaching 28, 32, and 36 F degrees. This is especially useful for the hard frost (28 F) figures, which are not commonly available elsewhere.

Also, when reviewing this information, bear in mind that frost can occur in your garden even when recorded temperatures stay in the high 30's F. This is because weather stations record the temperatures five feet above the ground, while cold air sinks to ground level and this is where your plants grow. There is an official weather recording station two blocks from my home which never records the same temperatures as I see in my yard. It is always a few degrees higher from my thermometers (and I've tried several, just to be sure). With that much local variation possible, you can use the official numbers as a starting point, but be ready to keep an eye on the garden yourself. If a killing frost seems possible in your garden based on the weather forecast, then it may be time to harvest, unless you want to eat frozen vegetables tomorrow morning.

If you need more information about local frost or growing conditions, it is best to check with an expert in your area. The people who know it best are your county's Master Gardeners and agricultural extension agent, who have public duties to share information with local gardeners. Also, a high quality local nursery or a knowledgeable local farmer can be great sources of information as well.

Here is how I analyze the Climatic Data Center information to help determine planting times. First, the 10% and 90% levels are helpful to see, but I use the 50% level as my benchmark. Then I look at both the 32 F and 28 F dates to get a ballpark idea of when these frosts might occur. I plan to harvest (or am ready to harvest if the need arises) a few days early, just to be on the safe side.

Notice that, for various locations across the United States, the time gap between the expected first light frost (32 F) and the first hard frost (28 F) usually falls in the 9-21 day range. For example, Denver has a separation of 11 days, Boston has 14, Dallas has 15, and Atlanta and Sacramento both have 20. Assuming our plants are big enough by

then, they should survive a light frost and hopefully be able to grow for a few more days. We should harvest them before the hard frost comes unless we want to take our chances.

Putting It All Together: Three Possible Planting Strategies

By now, you may be thoroughly confused and wondering why I still have not given you a planting date. What should we do with all this information and how does it help us? Gardeners take different approaches to selecting a good planting date for late season gardens. Let's put all this information together and look at three different approaches to selecting a good planting date.

Approach #1 (Coldest Areas, Most Conservative)

This approach uses the first average frost date as a harvest date. It is the most conservative strategy, since you are taking on less risk of a killing frost (28 F degrees) by being ready to harvest at the expected arrival of the first light frost (32 F degrees). This approach also makes the most sense in colder areas where there are only a few days of separation between the expected light and heavy frost dates. Here is how it works.

Step 1: Choose a vegetable you want to grow and find its estimated days to maturity. Let's use Kohlrabi as an example, which needs 40 days to mature from planting to harvest...in warm weather. But remember that earlier in this chapter, I recommended adding 21 days to this date to account for cooler fall weather when plants grow more slowly.

$40 + 21 = 61$ growing days needed.

Step 2: Find your first average frost date and count backwards for the required number of growing days. Let's take Springfield, Illinois, which has a first average frost date of October 6. Counting backwards 61 days, that gives us a planting date on or about August 6. Using this approach, August 6 would be the best planting date for kohlrabi in Springfield, Illinois. Of course, you could plant it earlier, but your kohlrabi would not last as late into the year in storage. From an October 6 harvest, since kohlrabi with its top cut off will last in storage for 2-3 months, you are ensuring yourself some fresh vegetables into December and possibly January. Of course, you could pickle it, dry it, or (ironically) freeze it for extended enjoyment.

Approach #2 (Mild Winter Areas, Somewhat Riskier)

This second approach counts backward from the anticipated date of the first hard frost, not the first light frost. The idea is that all of the plants on our list are hardy enough to survive a light frost, but the hard frost will kill or severely damage most of them. Therefore, why not give your plants a few extra days or weeks of growing time, harvesting them just before hard frost?

Obviously, this approach carries added risk. An average date has as many occurrences before it as after it, so you have a good chance of losing your whole crop in any given year that you push things this late. But if you watch the forecast carefully and stand ready to pick everything if frost seems imminent, then you can take advantage of these few added days of growing weather.

Be mindful, also, that you are not just selecting a harvest date, but a planting date also. This means that your vegetables may not have matured if you need to pick them early. In most cases, this is not a problem, since new potatoes, baby leaf lettuce, and baby carrots are delicacies that command even higher prices in stores. But if your cabbage hasn't headed up yet or your broccoli florets are still small, then just remember they would have been ready, had you planted them just a little sooner.

Step 1: To calculate a planting date using this approach, you use the Climatic Data Center information to find the date when there is a 50% chance of temperatures dropping to 28 F degrees. (Actually, the report says "below" 28 F degrees, but I will continue to ignore this, since it makes the calculation more difficult and this is such an inexact science to begin with). This time, let's use Chattanooga, Tennessee as an example and try to squeeze some extra growing days beyond the first 32F degree frost (November 4) and first 28 F degree hard frost (November 16).

Step 2: Choose your vegetable, find the days to maturity, and count backwards from the first hard frost date. Let's try potatoes this time; the early maturing varieties require 60 days. Potatoes are a good candidate for pushing the season, since it is possible to harvest them before maturity at a slightly smaller size. Remember to add 21 days for the cooler temperatures and slower growth.

$60 + 21 \text{ days} = 81 \text{ growing days needed}$ (but a little less is OK for potatoes).

Find November 16 on the calendar and count backwards. That should put us in the ballpark of August 28. This is the last ditch planting date for potatoes in Chattanooga, Tennessee under this second approach.

Approach #3: Rolling Harvest (Hedging Your Bets)

The third approach allows you to hedge your bets by planting portions of your crop at different times. This aims for a rolling harvest where your plants will mature a week or two apart. You will be virtually assured of harvesting some veggies without frost damage, while later plantings will run that risk. You never sacrifice your whole crop, only parts of it. There are two different ways to plan for this.

Option #1: Starting in the summertime (no later than the planting date identified in Approach #1 above), plant a few vegetable seeds every week (not stopping before the planting date identified in Approach #2 above, and perhaps continuing even after that). This creates a rolling harvest, where you'll have a few more plants to pick each week or so into the fall. You may lose the later plantings, but the earlier planted veggies will have been picked by the time the hard frost hits.

Option #2: Divide your full planting into two, three or four portions, and stagger these plantings by a few days each. Again, you can use the dates in Approach #1 and Approach #2 as first and last sowing dates. If you prefer, you could plant the first portion earlier or the last one later. This way, you will be almost assured of harvesting 25-50% of your crop with the rest of it pushing Mother Nature's envelope a bit deeper.

Why Push It?

After reading the last section, you may wonder why gardeners would bother pushing their harvests by a few extra days (of cool, slow growth weather). Doing so involves a greater risk of frost damage. I think there is a pretty good argument for using Approach #1 and avoiding such a risk. However, there are some good reasons for growing later into the fall, besides the obvious reason of trying to get bigger veggies in those last few days.

One reason is that potential storage crops like potatoes, turnips, carrots, kohlrabi, and cabbage have limited storage lives. The later you can pick them, the deeper into the winter they can last. If you can

prolong their time in the ground by two weeks, then that is two more weeks they could last before the potatoes start sprouting and the carrots start bending without breaking.

A second reason is that mature crops store better than those picked early. A mature potato has a tougher skin and lower moisture content than a potato which was picked early. The tougher skin and lower moisture content can prolong its storage abilities.

There is one final reason: space. Many gardeners just do not have enough of it. You have only a few square feet of space on your lawn, in a raised bed, or in containers on a patio, balcony, rooftop, or even doorstep. Summertime is tomato, pepper, and cucumber time. You don't have space to plant a second garden until you are finished with the first one. Do you really want to rip out your summer vegetables at the peak of their harvest to clear space for cauliflower and beets? Probably not, which is another reason to wait as long as possible, perhaps delaying a fall garden planting until August or September instead of July. If you have a small garden and need to make this decision, you might consider some faster maturing veggies (such as spinach or lettuce) over longer season choices (like broccoli or carrots).

You can extend your harvest season [by using some of the methods mentioned later in this book](#). Oftentimes, even without an expensive greenhouse, you can cover and protect your crops easily. These coverings provide a few degrees of frost protection, keep off the wind and snow, and often allow your plants to make it all the way to a November, or even December or January harvest. Here is a picture of some homemade cold frames (from old window frames) being used to warm up the plants in a raised bed.



Chapter 5: Preparing the Soil and Fertilizing

Soil Preparation

Good garden soil contains a mixture of different ingredients. These include disintegrated fragments of rocks from the earth's crust, including sand, silt, and clay. Organic matter, which is formerly living plant tissue, is an important part of good soil as well. Soil provides structural support for a plant's roots and minerals for its nutrition (which usually should be supplemented by adding organic fertilizer as plant food as well). Whether you are planning to start your garden in ground rows, raised beds, or containers, it is important to give your plants healthy garden soil.

When growing plants directly in the ground, it is important to know what kind of soil you have already. You may be blessed with deep, rich growing soil and not need any amendment, but most soil can be improved by adding organic matter. If your soil is very heavy in clay, it may retain too much water, which can hurt your plants. If your soil has a high proportion of sand, then it may drain too quickly. The best way to remedy both types of soil is to dig in plenty of organic matter. Compost, aged manure, leaves, herbicide free lawn clippings, peat moss, and untreated sawdust are all examples of organic matter which can help improve soil structure. Place a thick layer of organic matter on top of your soil and dig it in as deeply as possible, so that plants'

roots have at least 10-12 inches of rich, loose growing soil.

If you are gardening with raised beds or containers, you probably will need additional soil to fill them. You can purchase readymade potting soil, which is a good option for container growers who may not have much space to fill. However, this can get expensive if you are filling large containers or raised beds. Another option is to fill them partly with any compost you can make or obtain for free. To fill raised beds or containers, you can use almost any combination of soil and compost as well as other ingredients like peat, sand, and low grade manure. The most cost effective mix that works well in raised beds is about 25% sand or perlite, 25-50% compost, and 25-50% peat moss. All of these materials are available at your local nursery, landscape supply, or big box home improvement store.

Fertilizer

Your plants will need additional minerals also. Most garden soil is adequate for growing weeds, but does not have the mineralization needed to produce big, nutritious vegetable plants. Look for a bag or box of organic fertilizer at your local nursery. It should be a balanced organic fertilizer with measurable quantities of the three major nutrients that plants need to grow: Nitrogen (N), Phosphorus or Phosphate (P), and Potassium or Potash (K). Fertilizer bags and boxes are labeled with the three N-P-K numbers to indicate the available proportions of these three key nutrients. A balanced fertilizer should be somewhere in the range of 5-5-5, 4-6-3, 7-4-2, give or take a bit. Look for an “organic vegetable” or “organic garden” fertilizer, which contains whole foods that feed the plants and build the soil rather than the harsh synthetic, chemical derived ingredients found in conventional fertilizers. Most of them also feed the plants with micronutrients and trace minerals, including calcium, magnesium, iron, and sulfur, while some fertilizers include beneficial soil building bacteria.

Many cold season vegetables are heavy feeders which need lots of this plant food. In particular, plants producing a lot of green, leafy growth need lots of available nitrogen. Broccoli, cabbage, lettuce, and spinach, for example, probably need a fertilizer with a Nitrogen (the first N-P-K) number of “5” or higher.

Root and tuber vegetables such as carrots and potatoes need plenty of phosphorus and some potassium as well, so make sure that the second and third N-P-K numbers are no lower than “2” or “3”. If you are

growing only root vegetables, then even a “bulb and bloom” type fertilizer should work, provided that it has at least a little nitrogen. Fruiting vegetables are not well represented on our cool season list, because most vegetables that produce fruit or seeds (such as tomatoes, peppers, squash, cucumbers, and beans) need the heat and light energy of summertime. Aside from peas, broccoli, and cauliflower, all of the plants on our cool season list are grown for their edible leaves, stems, and roots, which require less light energy for plants to produce.

Fertilizers are available in sizes ranging from 3-5 pound boxes all the way up to 25 and 50 pound bags. For a small garden, a little goes a long way. Follow directions on the fertilizer package label to apply it in your garden. Generally, this consists of putting a spoonful or two next to each plant (but not touching it), scratching this into the top few inches of the soil, and watering this in well.

Chapter 6: Garden Rows, Raised Beds, and Containers

Garden Rows

Garden rows are the cheapest way to get started with a vegetable garden. While they are not as productive as raised beds, they do not require any additional building materials or as much extra soil. If you are starting a garden in a part of the yard that has never been used to make beds before, then you will need to dig up the soil and prepare it.

First, if there are any grass or weed plants growing on it, mow these as close as possible to the ground, leaving the trimmings in place. Mark off the area you want to use for your beds. The width of each bed should be from 1-3.5 feet, and they can be as long as you want to fit your space. Wide rows are more productive, since you are preparing a larger growing area with rich soil for plants. But make sure your beds are not too wide that you cannot reach the very middle of the bed to plant, fertilize, weed, tend, or harvest the center. Use chalk, string, or corner stakes to mark the bed location to dig.

After marking the space, use a shovel or spade to dig up a shovelful of soil that is 6-12 inches deep. You can turn this over so that any grass or weeds goes to the bottom. Using the shovel or spade, break up the soil as well as you can. If your soil is light and easy to work with, then you are lucky.

If your soil has a lot of sand or clay in it, then you will need to work in some organic matter, such as compost, manure, leaves, peat, or

grass clippings. If it has lots of rocks or is pure clay, then you may want to consider investing in some containers or building your garden upwards (with a raised bed) rather than downwards. Keep digging up chunks, turning them over, and breaking them up until your whole bed area has been dug up and loosened.

Next, cover this soil with an inch or two of good compost, manure, or other organic matter. If you have enough organic matter for two or three inches of coverage, then use it all. Carefully dig this in to the top of the upturned soil, making sure not to bring up much grass or weeds, which will have a harder time regrowing if they are face down under the soil. Once you are done digging in the organic matter, water down the bed thoroughly, which will help the soil settle in.

Raised Beds

If you have the option to use raised beds, I believe they are the best growing option for most vegetables. These are beds where the soil is improved and mounded up above the ground level, usually requiring some walls to hold it up. Raised bed walls can be built from any materials available, including wood, stones, bricks, cinderblocks, tires, plastic, or metal.

While raised beds can be any size, shape, and height, building them at least 10-12 inches high ensures that plants will have plenty of growing room below. This is especially important when raised beds are built on top of concrete or really poor soil. In these situations, the raised bed essentially acts like a large container for plants to grow in. If you have good growing soil below, then a raised bed height of six inches or so will still enhance your vegetable production.

There are many advantages to using raised beds. First, the soil stays lighter and less compacted than ground soil, providing the plants' roots with plenty of spaces where air and water can reach them. This loose soil also drains well. Second, raised beds provide deeper, higher quality growing soil than exists in underground in most gardens. And third, the soil warms up more quickly in raised beds than the ground soil does, speeding plant growth. For all of these reasons, plants are more productive in raised beds than just about anywhere else (except for certain plants that grow particularly well in certain containers).

Additionally, raised beds simplify the tasks of gardening. People who are elderly, disabled, or have back problems will have an easier time accessing raised beds to tend, weed, and harvest from them. If you

have birds eating your crops, you can cover raised beds with netting much more easily than you can cover crops on the ground. If your lettuce needs some protection from the hot summer sun in late summer, you can put in some shade cloth very easily. You can easily install a row cover to protect against pests or a protective greenhouse/cold frame covering to extend the season a bit longer.

Your gardening life is easier with raised beds, but it often requires some startup cash to buy the materials and get them built. For my raised beds, I used redwood lumber, which is naturally rot resistant. I built seven four by four foot (4'x4') raised beds to height of 20-24 inches each. I use four by four inch (4"x4") or thinner corner posts, building the sides from flat pieces of two by eight (2"x8") or two by ten (2"x10") lumber, secured with weather resistant screws. For one of the beds, which was built on top of a patio surface, I lined the inside with plastic sheeting to hold in the soil, secured to the wood siding inside by heavy duty staples. I lined the other beds with poultry wire at the bottom and stapled this in to prevent gophers from entering the beds underneath.

At the time, it cost me about \$500 in materials and soil ingredients to fill the beds. Labor was free, since I learned to build them myself, eventually being able to build a whole bed in an eight hour day. You may be able to do better than I did in terms of cost, particularly if you can salvage some materials like old wood that someone is removing when replacing a fence or remodeling a house. Bricks and cinderblocks sometimes can be obtained for free, and can make a great permanent bed when they are mortared in.

Here is a picture of one of my beds, which is growing potatoes, broccoli, and blueberries. Yes, I know I used similar pictures in my [How to Grow Potatoes](#) and [Blueberries in Your Backyard](#) books, but it perfectly illustrates some of the possibilities in a raised bed. As you can see, part of the bed is connected to a chicken run. Our egg laying hens are kept away from the berries and vegetables by means of a temporary dog fence, which is attached to the chicken coop and run, and which gets moved around the garden periodically. While the chickens are using one bed, they fertilize, de-bug, and aerate the soil, preparing it for a later planting, and then move on to do the same thing in another location.

Chickens are very helpful in the garden, eating our kitchen scraps and providing plenty of fertilizer for the plants. If you would like to learn more about how to raise chickens for eggs in an urban backyard,

please take a look at my [e-book on this subject](#), entitled [Backyard Chickens for Beginners](#). Chickens are a lot easier to care for than most pets and you get fresh, organic eggs every day.



Containers

Many people do not have access to ground space for gardening. Some who do have ground space find that it is too rocky to plant or happens to be located almost entirely in the shade of a nearby tree or building. Perhaps you have a small yard that is covered over with a concrete or stone patio. No problem. Even if you do not want to build a raised bed on your patio, you can grow a garden in containers.

Every vegetable on our cool season list will grow just fine in containers. The key is to give them large enough containers to fit their root systems, provide them with fertilizer (since they cannot get any minerals from the ground), and keep them well watered. In many cases, you can get more production out of vegetables grown in containers than you can from them in the ground.

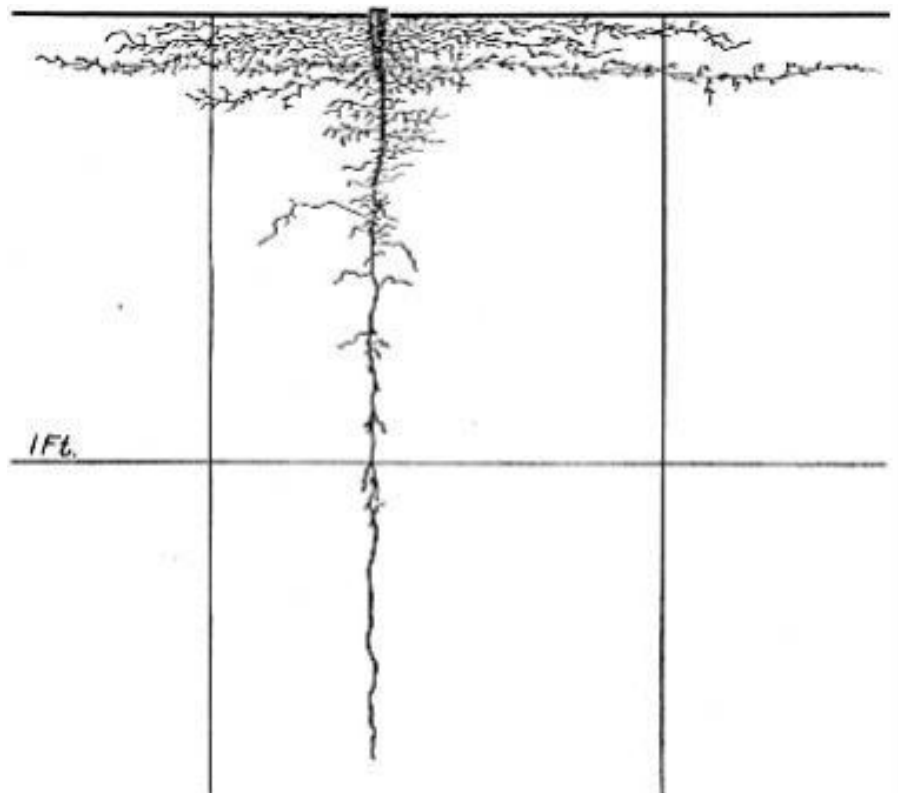
The size and depth of containers is important. In general, I would not plant vegetables in any container that is less than 12 inches wide at the top and less than 8 inches deep. The width is important in terms of how many plants you can fit in a container. If you follow the row

spacing guidelines for each plant in [Chapter 2](#), that should give plants enough space to grow without crowding one another. If you have deep containers, then you can get by with tighter spacing than this.

That depth is adequate for shallow rooted plants like peas and lettuce, but deeper rooted plants like carrots and broccoli will need 12 good inches of depth. Container growing will stunt some vegetable plants' growth a bit and you want to give the deep rooted plants as much growing space for their roots as possible. Yet there probably is no vegetable plant, even giant cabbage or indeterminate tomato, that cannot have a healthy life and produce effectively in a depth of 12 inches.

Take a look at the diagrams of root development that follow. I apologize in advance for the blurry quality, but they were created in 1927 when graphics were somewhat lower tech than today. I took them from a wonderful book called *Root Development of Vegetable Crops* by John E. Weaver and William E. Bruner (McGraw Hill 1927). You can read it online for free at [the Soil and Health Library](#), along with many other out of print and public domain titles.

Each square in a diagram represents one square foot underground. The first image below shows the roots of a lettuce plant at the age when you would first harvest its leaves. Besides the taproot, which mainly is searching for water, notice that all the growth is in the top few inches of soil. You could grow lettuce in a container with less than six inches of soil depth, probably even less for baby leaf lettuce. The same is true for peas, which are shallow rooted. And of course a smaller plant like mache could grow in almost any soil depth.



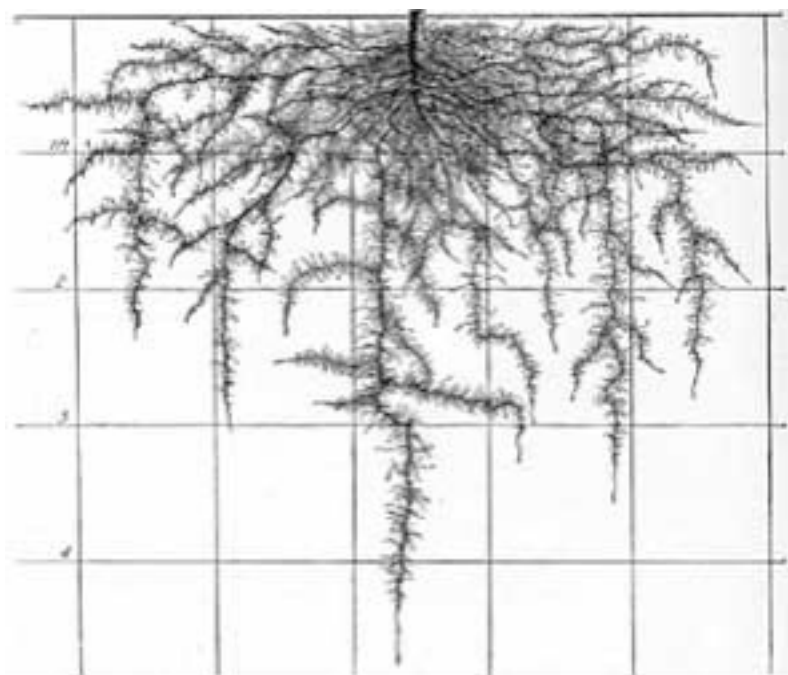
The second image shows a deeper rooted plant, cauliflower. Notice the grid squares are smaller, since we are looking at a larger area: these roots extend to a depth and width of five feet each. Cauliflower, like broccoli, cabbage, collards, and kale, needs plenty of growing space. This is not a lettuce plant where you can still pick some tender leaves and enjoy them if the plant is stunted and does not make it all the way to its full height potential. This is cauliflower, which will not produce its edible flowering heads until it is large and happy.

Don't try growing this puppy in a four inch deep dish. On the other hand, where is the vast bulk of its roots? Beyond that first square, we have a lot of secondary roots searching for nutrients and water. If you grew this plant in a container with a depth and width of 12-14 inches, providing it with fertile soil and plenty of water, you should get some large cauliflower heads. It will not have the same space to grow as it has in this picture, but it can get its business done in that much soil.

I know because I have grown broccoli, cauliflower, and kale before in just 12 inches of soil depth. The plants grew tall and produced plenty of food, apparently just as happy there as if they had been in the soil.

Of course, when you try to take them out at the end of the season, the entire soil mass of the container is locked up in their root system. But that is a good problem to have, because it probably means you had a great harvest.

When I see a root mass like that at the end of the season, I usually just chop it up with a shovel and dump it into the compost (cole crop stems and roots can be pretty tough; another source once recommended beating them with a mallet before adding them to a compost pile or bin). Another option I have is to put this root mass in the chicken run, where our hens do a pretty quick job of scratching, pecking, and dismantling it as they look for grubs and worms. Sooner or later, the rest of that soil will end up back in the garden once it has been manured by chickens and/or composted.



Cauliflower roots (each square is one square foot)

There are many different kinds of containers you can use to plant and grow your vegetables. For the vegetables in this book, I recommend four different kinds, each one of them ideally suited for a particular type of crop. However, these are by no means the only choices. Everything on our list will grow in just about any container, provided there is enough soil for the roots.

Four Recommended Container Types

Type 1: Self Watering Planter (for all vegetables, except root veggies and baby greens)

When self watering planters were fairly new, I raved about them in my first book, [Fresh Food From Small Spaces](#). Now, every nursery and garden center seems to sell them, which I am glad to see. Everything from tomatoes to broccoli to chard seems to perform very, very well in this type of container.

A self watering planter is a container with a water reservoir. The water is soaked up slowly into the soil by the plants' roots, which take what they need. The plants form a two level root system, one level going down to the water and the other roots taking in plant food from the fertilizer that you mix into the first few inches of topsoil. There is lots of aeration for the roots and you can never overwater them, because you are filling up the water reservoir through a tube, not directly watering the soil or plants.

Almost everything grown in these self watering planters is tremendously successful. I would not hesitate to use them for any vegetable on our list. However, I do not think they are the best choice for either root (and tuber) crops or baby salad greens. They're not deep enough for full sized carrots, beets, potatoes, or turnips. And since the water comes from the bottom up, the top of the soil is too dry to grow baby leaf lettuce or other shallow rooted greens that are picked early.

The best known self watering planters are [the Earthbox](#) and [the Tomato Success Kit from Gardeners Supply Company](#). The latter has a full range of self watering planters in various sizes, but most of them are too small to grow vegetables. The planter box they use for their Tomato Success Kit is about the same size as the Earthbox (which is 29" L x 13.5" Wx11" H) and holds a similar volume of soil, around 1.5-2 cubic feet. Any self watering planter of this size or larger should make an excellent investment for your vegetable garden.

You could grow three good sized broccoli, cauliflower, or cabbage plants in one of these. Given the limited soil depth, they tend to be a little stunted and do not produce as well as they do in raised beds, but they will produce. Head lettuce, spinach, chard, parsley, or any of the other full sized leafy greens on our list will perform even better in a self watering planter of this size.

One caveat: shallow planted seeds do not germinate well in these planter boxes. The reason is that the water is soaked up from below, so the top of the soil remains dry. So for something like lettuce or carrots, which have very small seeds that are planted at 1/4 inch deep, that top 1/4 inch cannot stay wet enough to ensure their germination. It is best to start lettuce seeds somewhere else and transplant them. Baby lettuce and greens are not worth transporting; just grow them someplace else, as any regular pot or container will work fine.

For carrots and other root vegetables, you are better off growing them in a regular container that has a little more space. However, if a self watering planter is all you have, it will grow you some carrots. At the end of the carrot section, back [in Chapter 2](#), you can see a picture showing the results of my carrot test with an Earthbox. We had to pick them a little earlier and did not get as many as we would have from a regular container, but it was not a bad little harvest of very tasty carrots.

Type 2: Deep Box or Tub (for root vegetables)

A carrot root can reach 10 inches long by itself, not even counting those stringy roots and hairs. It is possible to plant smaller varieties of carrots or pick them earlier as baby carrots, but full sized carrots need plenty of space. In fact, all root vegetables will benefit from deep soil, which also helps ensure that they will grow straight down rather than curling or branching out.

Therefore, use a deep container with at least 12 inches of soil depth for growing carrots, beets, turnips, Hamburg parsley root, and any other root vegetables. Potatoes, though not a root vegetable, grow underground and need deep soil to produce tubers. Small salad radishes might be the exception, because they are picked so early and are shallow rooted at that point, but longer radishes should be grown in deep containers as well.

The deep box or tub is any deep container. After I built my raised beds, I had enough scrap lumber laying around to build two very small planter boxes for the patio. Each one is about two feet by four feet (2'x 4') and they are 12 inches tall. Those wooden boxes, assuming I remember to water them, are a great place for growing carrots.

Here are two other tub suggestions. First, one of those galvanized metal tubs they sell at nurseries and hardware stores should work pretty well. Those are plenty deep, and the last time I checked the price, I was surprised to see they were cheaper than some of the plastic containers. Second, any plastic Sterilite or Rubbermaid storage bin works great; I believe the 18 gallon bins are about 16 inches deep. With any bin or tub, you will need to punch some holes in the bottom to ensure proper drainage. Plants do not like getting wet feet, which is one reason so many home gardeners kill their houseplants.

Type 3: Shallow Box (for baby leaf lettuce and other baby greens)

If you plan to harvest lettuce at the baby leaf stage, then you do not need deep soil. The same is true for any other greens you grow for a baby leaf harvest, including arugula, chard, and kale. Honestly, you can pick any of these as early as you want. When they first germinate, they are known as sprouts, and many people grow sprouts in their kitchen even without soil. After about ten days, sprouts are classified as microgreens, which are often used in salads and garnishes at gourmet restaurants.

Two inches of soil depth would be adequate to grow either sprouts or microgreens. I recommend using a deep nursery seedling tray or slicing a milk carton in half lengthwise and filling each half with soil. Seeds for microgreens can even be placed on top of the soil, without a covering of soil, as long as you keep them wet for germination (keep a spray bottle nearby and squirt them whenever you walk past). Remember to lay the seeds thickly, since the plants will not grow out very much before you clip them.

Further along, baby leaf lettuce is harvested in around 28-35 days. By that time, the plant has grown some stronger roots (see the picture of lettuce roots in the last section), so you would need to be growing these plants in a soil depth of at least 6-8 inches. But the truth is that some gardeners are eating lettuce at every stage from seeding: sprouts, microgreens, and 2-3 week “baby lettuce” in addition to the more traditional 28-35 day baby leaf harvest. Just choose a container with enough depth to support your plants up until the time you need them.

Type 4: Fabric Pot or Plastic Growing Bag (for potatoes)

As I wrote in my e-book, [How to Grow Potatoes](#), potatoes can produce a huge amount of spuds from [fabric pots](#) and [plastic grow bags](#). In fact, you can grow more spuds in these soft sided containers than you

can in the same amount of space in a raised bed, ground row, or any kind of container I know (without using some serious vertical growing tricks, as I explain in that book). The fabric pots are made from a cloth resembling felt and shaped into round, cylindrical containers. The plastic growing bags are like very deep shopping bags, sometimes made with handles for handing or carrying. These pots and bags are remarkably well suited for growing spuds.

There are several reasons they work so well. First, there are tiny air holes on the sides. When the roots hit air, they stop, branch out, and form more roots in new directions. More roots make more potatoes. Second, grow bags and fabric pots are usually dark in color, which absorbs solar heat and accelerates potato plant growth in cool seasons. But the air holes on the sides allow the soil to breath. This prevents them from overheating easily. Finally, all this air movement seems to really benefit potato plants, which like loose, well aerated soil.

The end result is that potatoes grow really, really well in these soft sided containers, so well that I recommend them above any other method...even above raised beds. Potatoes are the only plant I recommend growing in something other than a raised bed, since normally I consider raised beds to provide the best possible productivity for every vegetable. You can grow a ton of potatoes in raised beds, or in any garden row or deep container, but I doubt that you will exceed the growth possible in [fabric pots](#) and [grow bags](#). Not without some serious tricks.



Chapter 7: Extending Your Season

By covering and protecting your vegetable plants, you can extend your

growing season by several weeks or more. For gardeners in cold climates, this means a later harvest in early winter, an earlier start to the spring, and some fresh food from storage in between. Mild climate gardeners can use these techniques to grow food all through the coldest parts of the year. I will cover five of these techniques here: greenhouses, cold frames, hot beds, growing tunnels, and moving potted plants indoors. The first one can be quite expensive, the last one is free, and the others fall somewhere in between in terms of cost. Greenhouses and hot beds can be heated, which allows anyone to grow food anytime.

Hardiness of Vegetables at Low Temperatures

I am always skeptical about minimum temperatures for vegetables, not because the sources are untrustworthy, but because there are so many variables. For example, even when air temperatures are low, soil temperatures may remain slightly warmer, which can have a big effect on plants. One advantage of covering and protecting plants is that the daytime temperature increases can keep the soil temperatures a bit higher, even when night air is cold. Another advantage is that coverings can block the wind, which is the equivalent of a few extra degrees in warmth

Here are the accepted minimum temperatures that each of the following vegetables can withstand. If you can keep your plants a few degrees warmer with a covering, you will continue to have fresh vegetables available for as long as you can protect them. Remember that plant seeds will not germinate at these temperatures and plants will not grow well; these are minimum survival temperatures and they are approximate only. Degrees are listed in Fahrenheit.

Arugula: 15 degrees
Beets: 20 degrees
Bok Choy: 24 degrees
Broccoli/Cauliflower: 10-20 degrees
Cabbage: 5-10 degrees
Carrots: 15 degrees
Chard: 20 degrees
Chicory/Endive: 10 degrees
Collards: 20-24 degrees
Kale: 10 degrees
Kohlrabi: 10 degrees
Lettuce: 15-20 degrees (some varieties)
Mache: 10 degrees

Miners Lettuce: 10 degrees
Orach: unknown; similar to spinach and chard
Parsley: 10-20 degrees
Peas: 25-32 degrees
Potatoes: 32 degrees
Radishes: 10 degrees for long radishes; small ones freeze more easily
Scallions: 10-20 degrees
Spinach: 10-20 degrees
Tatsoi: 15-22 degrees
Turnips: 10 degrees
Upland Cress: 10-25 degrees

Greenhouses

A greenhouse is a solid framed structure, covered with a clear glazing such as glass, polycarbonate, or plastic. Higher temperatures and greater humidity can be maintained inside, speeding the growth of plants and enabling a gardener to grow crops that would not be possible outside. Greenhouses come in many designs and in sizes ranging from tiny patio greenhouses to large professional grower greenhouses. While even the small ones can be quite expensive to buy, it is possible to make your own greenhouse and save some money. [Please see the Resources section below for more information on building your own greenhouse.](#)

When buying or building a greenhouse, there are several important considerations. The first consideration is affordability versus quality. The most expensive greenhouses use strong, long lasting materials, such as steel support frames and UV-treated polycarbonate glazing, built for longevity and durability. Many homemade greenhouses use wood frames and glass windows, which are durable also. The cheapest greenhouses are made from plastic support frames and low end glazing, such as polyethylene film or fiberglass panels.

If you want a good greenhouse, it will cost you. A well built greenhouse made from high quality materials can be used for many years, probably paying for itself over that time due to its increased yields. However, paying several thousand dollars up front is not an option for many people, who are forced to look for cheaper greenhouses. Unfortunately, the cheaper ones do not stand the test of time, some of them having an effective life of no more than three years. If you plan to use your greenhouse for at least a few years, it is probably worthwhile to invest in a better one. Alternatively, you can look at some of the other options for covering your crops, such as cold

frames, which can be a lot cheaper. [This site has an extensive selection of smaller sized greenhouses.](#)

The next important consideration is whether or not to heat your greenhouse. In the wintertime, an unheated greenhouse provides a few extra degrees of warmth, helping to overcome cold spells and extend the season. However, while daytime temperatures get much warmer inside a greenhouse, nighttime temperatures can fall pretty low. This is not a problem in most climates, where winter hardy staples like lettuce, kale, mache, and scallions will keep on trucking when they're protected from the winds and snow.

In the coldest climates, you need a little more help to continue growing throughout the winter. Heating the greenhouse at night, usually by means of an electric cable, can maintain higher nighttime temperatures that allow many different plants to thrive. Keep in mind that you cannot trick them completely by heating, since day lengths are much shorter in the winter and this means less light energy for the plants. But in a heated greenhouse, you can grow a lot of crops, a lot faster, than you could without one. With a heated greenhouse, you need to be extra careful that the structure is sealed well and does not allow valuable heat to escape at night.

During the daytime, though, you will need a vent or fan. A vent lets heat escape through the top to prevent overheating, which can occur quickly on sunny days. Greenhouses that are prefabricated or come from a kit should have a vent already included in the design. If you are building your own, you can incorporate either a vent or an exhaust fan. [Automatic vents, several of which are available here,](#) either begin opening at a certain temperature (such as 72 degrees F) or else they allow thermostatic control.

The [Resources section](#) at the end of this book contains links to additional information, including greenhouse building plans. In addition, it includes links to several websites that sell greenhouses at every level of the price spectrum. Here is a picture of a greenhouse in the United Kingdom with “windows” made from plastic soft drink bottles.



Growing Tunnels (Hoophouses)

The idea behind a growing tunnel or hoophouse is to use more affordable materials to achieve a greenhouse effect. This is really just a different version of a greenhouse. A growing tunnel can be as small as a cold frame or as large as a commercial greenhouse. Rather than building a full support structure, lengths of wire or plastic PVC pipe can be bent into half circle arches and placed every few feet, secured to the ground on each side of the bed. Steel pipes can also be bent into half circles and used. Plastic film is then stretched over the outside of this “frame” and fixed in place to create an enclosed greenhouse on the cheap.

These growing tunnels have become very popular in commercial agriculture. Here is a picture from the U.S.D.A. showing some Alabama farmers who are growing tomatoes in winter in a large tunnel.



Cold Frames

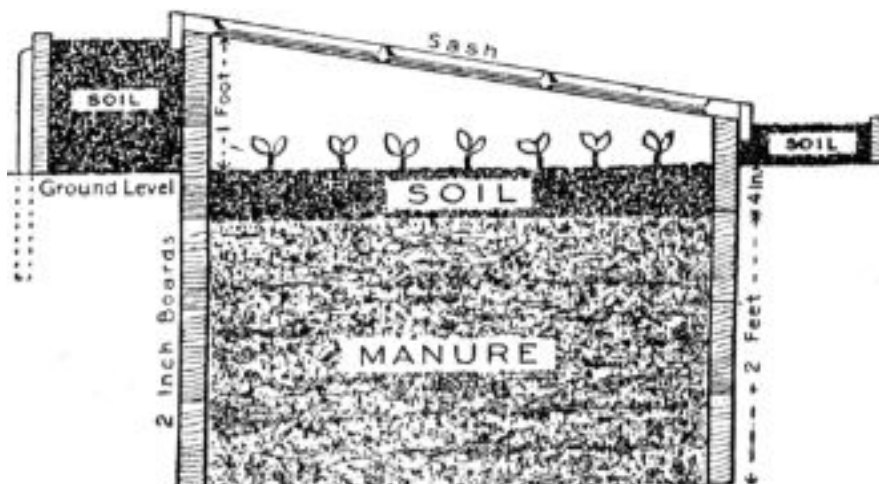
A cold frame is an open bottomed box with a clear framed lid that lets in sunlight. The walls are usually made of wood and often insulated, while the lid can be made of glass, plexiglass, polycarbonate, or any material that lets in light. Old window frames are often used as lids, also known as sashes, and hinged at the top to allow opening.

Because cold frames are used primarily in cool seasons, when the sun comes in at an angle (from the south, in the northern hemisphere), the top is slanted from back to front. In addition, soil can be mounded up on each side to provide additional insulation. And you can use any other type of insulation inside or outside the walls.

Some people also include a very simple passive solar heater inside. The most common method for this is to put a water filled container or two in your cold frames (preferably with each container painted black). The water heats up in the sunlight and then continues to heat the cold frame as temperatures drop. Water is very dense and releases a tremendous amount of energy as it cools, keeping your plants warmer at night.

Hotbeds

A hotbed is a cold frame that is supplied with extra heat. To provide extra heat, people normally use electric heating cables, but you can also keep the temperature up by using a light bulb, hot water pipes, or a thick layer of actively decomposing manure. [A free article which describes how to build a cold frame and incorporate the hot manure layer can be found here.](#) This image shows you a diagram.



Electric soil heating cables are probably cheaper, more efficient, and safer than installing light bulbs. These cables are available at nurseries and online. [Here are several sold on Amazon](#) and [more from Farmtek Growers Supply](#). Some cables have built in thermostats to maintain soil temperature in a moderate range. They are available in many different lengths, most commonly providing an output of 3.5-6.7 watts per foot. You generally need to use 1-2 feet of cable for each square foot of garden bed, and the cables are installed a few inches underground (follow installation directions that come with your cable). Do not cut the cables to achieve your desired length; just buy one with the approximate length to fit the size of your bed.

Here is a picture of a miniature growing tunnel (hoophouse) that doubles as a hotbed. The gardener has filled it with compost that is actively decomposing, helping to maintain a higher internal temperature.



Moving Plants Indoors

If you grow vegetables in containers, there is always the possibility of moving these from a cold location to a warm one. Normally, this means bringing them indoors when the weather turns really cold. Obviously, this will not work for a bath tub sized planter box filled with hundreds of pounds of soil and potatoes, but how about a few smaller containers that each hold a parsley or spinach plant? Smaller containers with smaller plants can be brought indoors, where you can continue to clip a few leaves as you need them. Water the plants, keep them near a sunny window, and you should be able to keep them alive for a few extra weeks of fresh food in the wintertime.

Chapter 8: Harvesting and Storing Your Produce

Many vegetables can be stored for use during the winter months. Root vegetables and late maturing potatoes make the best storage candidates. Kohlrabi and cabbage can be kept for surprisingly long periods as well. Broccoli, cauliflower, peas, and all the leafy greens on our cold season list need to be used more quickly, generally within a week or two. However, any vegetables can be preserved by freezing them, while some can be pickled, canned, or dried as well.

While it is possible to store vegetables for long periods in the refrigerator, this tends to dry them out. Late maturing potatoes, beets, carrots, turnips, long types of radishes, cabbage, and kohlrabi will

keep better in moist, cool conditions in a temperature range of 32-40 degrees F. A root cellar, unheated garage, basement, attic, or out building might be a good option, depending on what space you have available at your home. In times past, many people stored vegetables in storage clamps.

To make a clamp, select a dry part of your property. It can be a flat spot or a sloped area on the side of a hill. Dig a large hole there and line the bottom with a thick layer of straw (or shredded paper, sand, or sawdust from untreated wood). Place one layer of root vegetables on the straw, packed loosely to allow for air circulation. Cover this with another layer of the straw. Place another layer of root vegetables on top, cover it again, and repeat until you have filled most of the hole. Finally, cover it with a thick layer of straw on top and hold this down with some scrap wood or stones. Take out a few vegetables as you need to use them, starting on the top layer and working downward.

A storage clamp works best if you have a lot of produce to store for the winter. This method also leaves your food vulnerable to soil-based pests such as gophers, voles, or digging rats. You might be able to strengthen your clamp by lining it first with sharp gravel and then straw, then covering the top with a tough piece of wood that is drilled with small air holes and heavily weighted down with stones or cinderblocks. Another option is to take an old refrigerator or barrel and bury it most of the way in the hole, layering and covering as you would with an open clamp. On a smaller scale, you can just store vegetables in a cardboard box on a shelf in an unheated garage, cellar, or other cool location.

[These bags, made by a company called Orka](#), are very convenient for vegetable storage. They work especially well for storing potatoes, onions, garlic, and root vegetables. They have handles for hanging, so if you have a storage area which is already pretty full, you will not need to use extra horizontal space. These could be hung from a wall or rafters.

Below is a list of the vegetables on our cool season list, which is sorted into different categories for storage purposes. After this information, we will cover storage by freezing, drying, pickling, and canning.

Root Vegetables, Potatoes, Cabbage, and Kohlrabi (store in moist, cool location, 32-40 degrees F)

Beets: Wash roots, trim tops to 1/2 inch, and store in perforated plastic bags for 3-4 months.

Carrots: Same directions as for beets.

Cabbage (heads): Cut off cabbage heads at the base when they are firm. Storage varieties can be kept in a plastic bag for up to three months in a cool place.

Cabbage (leafy, Chinese Cabbage): Same directions as above, but storage time is less, probably 1-2 months.

Kohlrabi: Cut off the root from the bottom and the leaf stems from the top. Kohlrabi will store in the refrigerator or another cool place for as long as 2-3 months.

Radishes: Wash and cut off tap root and top. Store small radishes for one month and longer radishes for 3-4 months.

Turnips: Wash roots, trim tops to 1/2 inch, and store in perforated plastic bags for up to 3-4 months.

Broccoli and Cauliflower (best kept in refrigerator)

Broccoli/Cauliflower: Does not store for long periods. In the refrigerator, fresh picked broccoli or cauliflower will last 1-2 weeks. It should be stored in a perforated plastic bag.

Leafy Greens (best kept in refrigerator)

Arugula, Chard, Chicory/Endive, Lettuce, Kale, Spinach, and other greens: To harvest, break off or cut leaf stems near the base. Store in plastic bags in the refrigerator for 1-3 weeks.

Others: Peas, Parsley, and Scallions

Peas: Sugar snap and snow peas can be washed and kept in a plastic bag in the refrigerator for up to two weeks. Shelled peas need to be frozen, since they will not last long otherwise.

Parsley: Pick the leaves and stems, wash, and keep in a plastic bag in the refrigerator for 1-2 weeks. Another way to extend your parsley season is to plant it in a pot you can move indoors. Keep harvesting parsley leaves as you need them, and you should get a few extra

weeks out of it this way.

Scallions: Pick them when they get big enough to eat. Wash and cut off roots. Also cut off the tops of the stems. They will keep in a plastic bag in the refrigerator for two weeks. You can keep them longer and still use the white part at the base, but you will need to cut off the green leaves, which will wilt and decay.

Freezing Vegetables for Later Use

All vegetables on this list can be frozen. While it is possible to just wash, cut, and freeze your vegetables, it is best to blanch them first, which ensure that they will retain more flavor and color in the freezer. The basic procedure is this: Wash, trim, and chop potatoes or root vegetables into bite sized pieces. Prepare two pots of water, one filled with ice water and the other placed on the stove to boil.

You will also need a slotted spoon or pasta server for removing the vegetables from the hot water when they have been blanched. If you are only preparing one batch, then you can use a colander in the sink to strain the vegetables out of the water, but if you are blanching more than one batch at a time, then it seems wasteful to dump out your hot water each time, so a slotted spoon or pasta server works best for removing the vegetables from the water.

Once the vegetables have been chopped and the pot on the stove is boiling, dump them in and set a timer for exactly two minutes. As soon as two minutes are up, immediately remove the vegetables from the hot water and move them into the ice water. Once they are cooled, you can freeze them in plastic locking zipper bags or freezer containers for use at any time over the next year. These frozen vegetables will last at least 8-12 months.

Drying, Pickling, and Canning

There are several other ways to preserve your own vegetables: drying, canning, and pickling. [Here is an excellent free guide](#) for canning your own fresh vegetables. To pickle vegetables, you can use either a vinegar brine (like most pickled cucumbers you buy in the store) or lactic acid fermentation, which works for sauerkraut, kimchi, and other fermented vegetable dishes. My [Fresh Food From Small Spaces](#) book has some good sauerkraut and kimchi recipes. These recipes rely on natural yeasts and beneficial bacteria (like those in yogurt) for fermentation. If you would like a great free sauerkraut recipe and a

stronger indoctrination into the world of Wild Fermentation, let me refer you to [Sandor Katz's website](#). For vinegar pickling and in depth canning information, I recommend the book [Putting Food By](#), which is the definitive canning guide.

You can also dry vegetables to preserve them. [Here is a good free guide on preservation by drying](#). Sun drying is possible, but probably not practical in cold weather. The other two methods are to use a food dehydrator machine or to dry them in the oven on the lowest temperature setting. Dried vegetables do not taste that good, but they can be added to soups or stews to reconstitute them. Root vegetables can be sliced, and will become dried vegetable chips, while leafy greens can be dried and turned into powder. If they are dried at low temperatures (under 110 degree F), they will still have much of their nutrition intact.

Storing in Place

There is one final storage possibility. Carrots, beets, and other root vegetables can be stored in the ground. This only works well in climates where the ground is workable in wintertime, but which are cold enough so that the plants will not start growing again during the winter. After the plants freeze back in the late fall, cover the soil with a thick layer of mulch such as straw or leaves. Make sure this is kept in place with some wood, so that it does not blow away. Then whenever you need a few carrots or beets, just peel back the mulch and dig up a few roots to wash and eat. You can keep doing this into early spring, but make sure to pick and eat them all before they start growing again in early spring. It doesn't get much simpler than that!

My Secret Winter Nutrition

Finally, here is my secret to winter nutrition. I grow kale in a big raised bed until the plants start to get too old and tough. Picking all the leaves, I wash them (often enough to fill 3-4 paper shopping bags). I then turn on my juicer machine and juice all the leaves, which fill the juicer cup with dark green juice that is incredibly dense with vitamins, minerals, and antioxidants. (You can add a little of this to some other juice for an amazing nutritional boost, but this stuff is pretty hard to drink in any major amount.)

Then I fill up several ice cube trays with the kale juice. Once these are frozen, I empty them into a plastic locking zipper bag. Every time we make soup, stew, beans, eggs, pasta, you name it, I shave in a little

kale ice. The kids never know what wonderful nutrition they are getting. I do this a couple of times per year and so we always have a steady supply.

Resources

Cold Hardy Vegetables

Additional Information on Cold Hardy Vegetables from University of Minnesota and Oregon State University:

<http://www.extension.umn.edu/distribution/horticulture/M1227.html>

<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20754/pnw548.pdf?sequence=3>

Vegetable Seed Suppliers (Online Ordering)

Johnny's Selected Seeds: <http://www.johnnyseeds.com>

Territorial Seed Company: <http://www.territorialseed.com>

Park Seed: <http://parkseed.com>

High Mowing Organic Seeds: <http://www.highmowingseeds.com>

Peaceful Valley Farm & Garden Supply: www.groworganic.com

Seed Potato Suppliers

Potato Garden: <http://www.potatogarden.com>

Irish Eyes Garden Seeds: <http://irisheyesgardenseeds.com>

Moose Tubers: <http://www.fedcoseeds.com/moose.htm>

Storing Vegetables

Information from Cornell and Iowa State Universities on How to Store Vegetables:

<http://www.gardening.cornell.edu/factsheets/vegetables/storage.pdf>

<http://www.extension.iastate.edu/Publications/pm731.pdf>

Canning Vegetables

Excellent free guide:

<http://www.uri.edu/ce/ceec/food/documents/GH%201454.pdf>

Drying Vegetables

Good free overview:

http://nchfp.uga.edu/publications/uga/uga_dry_fruit.pdf

Sauerkraut and Wild Fermentation

Sandor Katz's website: <http://www.wildfermentation.com/making-sauerkraut-2>

Building a Greenhouse

DIY Plans for 12'x14' greenhouse made primarily of PVC pipe and plastic sheeting: http://www.bae.ncsu.edu/programs/extension/publicat/postharv/green/small_greenhouse.pdf

Links to Free Greenhouse Building Plans and Information: <http://www.sherrysgreenhouse.com/pages/structures/greenhouses-build.html>

How to Build Your Own Greenhouse book: http://www.amazon.com/How-Build-Your-Own-Greenhouse/dp/158017647X/ref=sr_1_2?s=books&ie=UTF8&qid=1340396975&sr=1-2&keywords=building+greenhouse

Greenhouses for Sale Online

Good selection of smaller greenhouses: <http://www.littlegreenhouse.com/flowerhouse.shtml>

All sizes of greenhouses: <http://www.4seasongreenhouse.com/>

Building Cold Frames and Hot Beds

Excellent article from Mother Earth News:

<http://www.motherearthnews.com/modern-homesteading/how-to-build-a-hotbed-zmaz76mazhar.aspx>

Information from University of Missouri and Purdue Extension Programs:

<http://extension.missouri.edu/p/g6965>

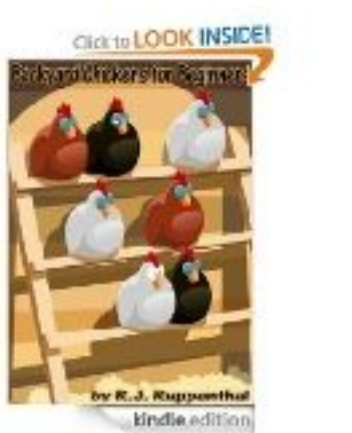
<http://www.hort.purdue.edu/ext/HO-053.pdf>

In-Depth Book on Growing Vegetables in Unheated Greenhouses in Winter

Eliot Coleman is the master of growing vegetables in unheated greenhouses, which he does in the wintertime in Maine. He has several good books, including *The Winter Harvest Handbook*, available on Amazon.

My Publications (All are available on Amazon.com as Kindle e-books; some titles are sold there in print versions also)

1. Backyard Chickens for Beginners: Getting the Best Chickens, Choosing Coops, Feeding and Care, and Beating City Chicken Laws



Description from Amazon:

Excellent booklet for beginners on how to start a backyard mini-flock of 2-4 chickens and get fresh eggs every day. Written by the author of the best-selling *Fresh Food From Small Spaces* book, a former columnist for *Urban Farm* magazine.

Topics include:

- Fresh Eggs Every Day
- How Much Space Do You Need?
- Building or Buying a Coop
- Feeders, Waterers, Nesting Boxes, and Roosts

- Getting Chicks or Chickens
- Feeding Your Chickens
- Tips for Cold Climates
- Health and Safety
- Dealing with Neighbors, City Chicken Laws, and Other Challenges
- Resources: Everything You Need!

2. **Blueberries in Your Backyard: How to Grow America's Hottest Antioxidant Fruit for Food, Health, and Extra Money**



Description from Amazon:

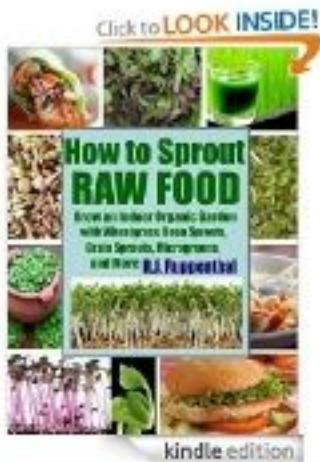
Perfect blueberry growing guide for beginners. This booklet explains how to plant and grow blueberries in the home garden. Recommended for backyard gardeners with small city-sized yards, patios, balconies, decks, and rooftops. (Updated 2012 version)

Topics include:

- Why Grow Blueberries? Six Great Reasons
- Blueberries for Every Climate (and where to get them)
- Grow Blueberries Almost Anywhere: Doorsteps, Patios, Balconies, Rooftops, and Yards
- Perfect Blueberry Soil (regular garden soil kills them, but they will thrive in this!)
- How to Plant and Grow Blueberries in Raised Beds and Containers
- Feeding, Watering, and Caring for Your Blueberry Bushes
- Making Extra Money Growing Blueberries

3. **How to Sprout Raw Food: Grow an Indoor Organic Garden**

with Wheatgrass, Bean Sprouts, Grain Sprouts, Microgreens, and More



Grow Your Own Raw Food Anywhere!

Would you like to grow some of your own food this year? Indoors? With no sunlight or soil? At any time of the year and at all times of the year? Sprouts allow you to do all that and more. In fact, you can grow all the vegetables your body needs (plus all the protein as well) in an area that's no bigger than your microwave oven. I grow sprouts on top of my refrigerator, harvesting baskets of fresh, raw food every week without even going outside.

Growing sprouts is simple and it's cheap. Sprouts can provide you with the power-packed nutrition your body needs at a fraction of the price of store bought food. You can save money while eating right. There's no dirt, no pests, and no weeding required.

Contents Include:

1. Superfood Sprouts

Cheap, Easy to Grow, Provide Year-Round Nutrition

2. The Benefits of Raw Food

Lose Weight, Nourish Your Body, and Stimulate Energy Levels

3. Sprouting Equipment and How to Use It

Trays, Jars, Bags, Automatic Sprouters, and Wheatgrass Juicers

4. Salad and Sandwich Sprouts

Alfalfa, Clover, Radish, and Broccoli

5. Bean Sprouts

Mung Beans, Soy Beans, Lentils, Peas, and More

6. Grain Sprouts

Wheat, Barley, Rye, Oats, Triticale, Quinoa, and Other Grains

7. Seed and Nut Sprouts

Sunflower, Sesame, Pumpkin, Peanut, and Flax

8. Seasoning Sprouts

Basil, Celery, Cress, Dill, Fenugreek, Mustard, Onion Family, and More

9. How to Grow Microgreens

Grow a Gourmet Baby Salad, Anytime, Anyplace!

10. Wheatgrass Juice From Homegrown Sprouts

How to Grow and Juice Your Own Wheatgrass

11. Where to Get the Best Sprouting Seeds

Trusted Sources for the Freshest Quality

12. Where to Find the Best Raw Food Sprout Recipes

Delicious ways to enjoy your sprouts, raw or cooked

Author Info

R.J. Ruppenthal is a licensed attorney and college professor who has a passion for growing and raising some of his own food. He is based in California, though he has experience trying to grow winter vegetables in Wisconsin. He regularly writes and blogs about fruit and vegetable gardening, growing food in small urban spaces, sustainability, and raising backyard chickens. On occasion, he even pens something about law or government. You can follow his blogs on his author page at http://www.amazon.com/R.J.-Ruppenthal/e/B00852ZTT2/ref=ntt_athr_dp_pel_1

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Cabbage snow: Flickr user “quinn.anya”, www.flickr.com

Kohlrabi: La Grande Farmers’ Market

Mache: Flickr user “rfarmer”, www.flickr.com

Window frames: Flickr user “dyogi”, www.flickr.com

Potato grow bags: Courtesy of Gardeners Supply Company

Greenhouse of bottles: www.geograph.org.uk, NH5319

Large growing tunnel with farmers: <http://blogs.usda.gov/tag/hoop-house>

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Fall and Winter Gardening: 25 Organic Vegetables to Plant and Grow for Late Season Food

Chapter 1: Introduction: Late Season Gardening

Chapter 2: 25 Vegetables for Cool Seasons

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